Barco n.v.
Video & Communications
Th. Sevenslaan 106
B-8500 Kortrijk (Belgium)
Tel. 056/23.32.11 - Telex 85.842 barind b
FAX (0)56/21 27 81
HR. Ieper 28.186 - BTW 421.577.737
K.B. Kortrijk 460-0328901-14

VERY HIGH RESOLUTION COLOUR DISPLAY

CDCT 6151 - 6351

TECHNICAL MANUAL

MAY 1990

SECTION I : TECHNICAL SPECIFICATIONS

1. VISUAL PERFORMANCE

1.1 Resolution

1024 x 768 pixels (max. addressable).

1.2 Video amplifier

Frequency response (±3 dB) : 22 MHz.
Pulse rise and fall time : 25 ns.
Black level stability between 0% and 100% APL : 1%.

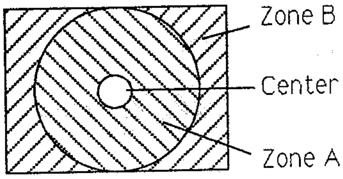
Double clamping system : hard and soft clamping.
Switchable clamping system : sync tip clamping or backporch clamping.

1.3 Picture tube

Type : 20 inch pitch 0.31 mm, high resolution in-line gun dotted screen type, black matrix.
High precision self converging deflection yoke.

Max. converging error (in mm)

in center zone :	0.15 mm
in zone A :	0.5 mm
in zone B :	0.65 mm



Useful screen area for cabinet version : 350 mm x 267 mm.

Light output adjusted for normal persistence phosphors (calibrated position):
white 100% : 60 nit
black level : 0.3 nit
Maximum light output during a short time (NP tubes) : 200 nit.

1.4 Scanning systems

Flexible scanning system

Horizontal frequency range : 15 kHz to 25 kHz, divided in 3 ranges :

Range	Minimum frequency	Maximum frequency
LOW	15 kHz	18.2 kHz
MEDIUM	18.2 kHz	21.4 kHz
HIGH	21.4 kHz	25 kHz

Minimum video input signal blanking required : 9 µs.

GENERAL INFORMATION

Thank you for purchasing one of our products, the CDCT6151 colour display.With natural care, it will give you many years of outstanding performance and personal delight.

The CDCT 6151 is an ergonomic high resolution colour display with a resolution of 1024 x 768 pixels.

Changes in this information are possible due to manufacturing, design or traceability to safety regulations .

PRECAUTIONS

Avoid direct lightrays into the CRT, if unable use a tilt and swivel base for a correct position and a optical filter for reflections.

Provide a proper ventilation area around the display.

Avoid magnetic fields in the neighborhood to prevent CRT colour impurity.

Keep the display away from heatgenerating equipment.

SERVICE SAFETY PRECAUTIONS

WARNING: X-RADIATION

X-RADIATION CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON-CONFORM COMPONENTS. THESE COMPONENTS ARE MARKED IN THIS SERVICE MANUAL BY AN *.

WARNING: SAFETY

ELECTRIC SHOCK OR FIRE HAZARD CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON-CONFORM COMPONENTS. THESE COMPONENTS ARE MARKED IN THIS GUIDE BY A ! SIGN.

REPLACE WITH CONFORM TYPES ONLY!

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1. Comply with all caution and safety-related notes on or inside the instrument cabinet, on the chassis, or on the picture tube.

2. When service is required, maintain correct lead dress and parts placement. Extra precaution should be taken to assure proper lead dress in the High Voltage circuit area.
Where a malfunction has occurred, those components or circuits that indicate evidence of abnormality should be replaced or corrected. Always use the manufacturer's safety specified replacement components.

3. Do not remove, install or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away when picture tubes are handled. Keep the picture tube away from the body while handling.

4. Protective shields are provided on this chassis for the protection of both the service technician and the costumer.
Protection shields removed for service convenience must be re-installed correctly and ANY MISSING SHIELD MUST BE REPLACED. DO NOT OPERATE THIS INSTRUMENT WITHOUT THE PROTECTIVE SHIELDS IN POSITION AND PROPERLY SECURED.

5. After any service intervention, the service technician must be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently defeated during servicing. Therefore, the following checks are recommended for the continued protection of the costumer and service technician.

GROUNDING CONTINUITY TEST

- Remove main plugs from wall outlet.

- With an Ω-meter in its lowest resistance range, measure resistance between the grounding prong of the mains plug and all accessible conductive parts.
THE METER MUST BE READ ZERO OHM.

- The mains plug still being removed from the wall outlet, switch on the instument.
- Switch an Ω-meter in its highest resistance range, measure resistance between the grounding prong of the mains plug and the two other prongs of the mains plug.

BOTH METER READINGS HAVE TO BE MORE THAN 5 MEGOHM (5 MΩ).
ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE, THE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND CORRECTIVE ACTION MUST BE TAKEN BEFORE RETURNING THE INSTRUMENT TO THE COSTUMER.

X-RADIATION AND HIGH-VOLTAGE LIMITS

The primary source of X-radiation in solid state display units is the picture tube. The picture tube is specially constructed to limit X-radiation emissions. The shields and mounting hardware for picture tubes have an X-radiation protection function and must be properly in place.
For continued X-radiation protection, the replacement tube must be the same type as the original, including suffix letter. High voltage is maintained within specified limits by the use of close tolerance safety related components/ adjustments in the power supply circuit. Refer to the technician X-radiation warning note on the Chassis Schematic and Instrument Labels in the Basic Service Data for specific high-voltage limits of each chassis and X-radiation Protection Circuits. If high voltage exceeds specified limits, check each component specified in the chassis schematic diagram and take necessary corrective action.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in display units have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by then necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Data and its Supplements and Bulletins. Electrical components having such features are identified by ! or * on the schematics and on the parts lists in this Data and its Supplements and Bulletins. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts lists in this Data and its Supplements and Bulletins, may create shock, fire, or excessive X-radiation.

NOTE FOR USERS IN THE UNITED KINGDOM

IMPORTANT:

The wires of the mains lead are coloured in accordance with the following code:
Green and Yellow : EARTH
Brown : NEUTRAL
Blue : LIVE
Plug fusing value: 5 A

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
- The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked by the letter E of by the safety earth symbol ⏚ or coloured Green and Yellow.
- The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Black.
- The wire which is coloured Brown must be connected to the terminal which is marked with the letter L or coloured Red.

WARNING: This apparatus must be earthed.

DIESES TECHNISCHE HANDBUCH SOLLTE SORGFÄLTIG GELESEN WERDEN BEVOR DIE NETZSPANNUNG ANGELEGT WIRD

ACHTUNG RÖNTGENSTRAHLUNG !!

ERHÖHTE RÖNTGENSTRAHLUNG KANN VERURSACHT WERDEN, WENN BESTIMMTE BAUTEILE DURCH TEILE ERSETZT WERDEN DIE NICHT DER SPEZIFIKATION DES HERSTELLERS ENTSPRECHEN. SOLCHE BAUTEILE SIND IN DIESER WARTUNGSANLEITUNG DURCH EIN * GEKENNZEICHNET.

ACHTUNG SICHERHEIT !!

WERDEN BESTIMMTE BAUTEILE DURCH TEILE ERSETZT, DIE NICHT DER SPEZIFIKATION DES HERSTELLERS ENTSPRECHEN, SO KANN EIN ELEKTRISCHER SCHLAG ODER BRANDGEFAHR DIE FOLGE SEIN. SOLCHE BAUTEILE SIND IN DIESER WARTUNGSANLEITUNG DURCH EIN ⚠ GEKENNZEICHNET.

WARTUNG

VOR DEM ÖFFNEN DES MONITORS IST DIESER AB ZU SCHALTEN !

1. Sämtliche Sicherheitsvorschriften auf der Außen- oder Innenseite des Gerätes bzw. auf der Bildröhre sind zu beachten.

2. Ist eine Wartung erforderlich, so ist die richtige Verdrahtung und die korrekte Einbaulage der Teile zu beachten.
   Es ist besonders darauf zu achten, daß im Hochspannungsbereich eine korrekte Lage gewahrleistet bleibt. Nur solche Ersatzteile verwenden, die der Spezifikation gemäß den Sicherheitsvorschriften des Herstellers entsprechen.

3. Vor dem Ausbau der Bildröhre ist die Anodenleitung und die Anode der Bildröhre gegen den Chassisrahmen zu erden, damit eine vorhandene Ladung abgeleitet werden kann.
   Beim Aus- oder Einbau oder bei sonstiger Handhabung der Bildröhre muß eine Schutzbrille getragen werden. Wer keine derartige Schutzbrille trägt, darf sich nicht in den Bereich aufhalten, wo Bildröhren gehandhabt werden. Bildröhren sind bei ihrer Handhabung vom Körper weg zu halten.

4. Nach erfolgter Wartung muß der Kundendiensttechniker sicher sein daß während der Wartung keine vom Hersteller eingebaute Schutzvorrichtung beschädigt oder unabsichtlich zerstört wurde.
   Es empfiehlt sich daher, zum Schutz der Kunden und des Technikers folgende Kontrollen durchzuführen:

SCHUTZLEITERANSCHLUß UND BERÜHRUNGSCHUTZ

- Netzstecker aus der Steckdose ziehen.
- Mit einem auf kleinsten Widerstandsbereich eingestellten Ohmmeter den Widerstand zwischen der Erdung des Netzsteckers und allen zugänglichen leitenden Teilen messen.
  AM OHMMETER MUß < 0.1 OHM GEMESSEN WERDEN.

- Bei weiterhin gezogenem Netzstecker, das Gerät einschalten.
- Mit einem auf höchsten Widerstandsbereich eingestellten Ohmmeter den Widerstand zwischen der Erdung des Netzsteckers und den beiden anderen Stiften des Netzsteckers messen.
  ES MÜSSEN JEWEILS MEHR ALS 5 MEGOHM ABGELESEN WERDEN.

ERGEBEN DIE MESSUNGEN ABWEICHENDE WERTE, SO KÖNNTE DAS AUF EINE GEFÄHRLICHE BERÜHRUNGSSPANNUNG HINDEUTEN, SODAß ABHILFE GESCHAFFEN WERDEN MUß, BEVOR MAN DAS GERÄT DEM KUNDEN ZURÜCKGIBT.

Die Bildröhre ist Hauptverursacher von Röntgenstrahlung.
Sie hat eine besondere Bauform um die Röntgenstrahlung auf ein Mindestmaß zu begrenzen.
Die Ersatzröhre muß vom gleichen Typ sein wie die Originalröhre, damit ein dauerhafter Schutz vor Röntgenstrahlen gewahrleistet ist.
Durch den Einbau von besonders maßgenauen Sicherheits Bauteilen / Abgleichungen im Netzteil wird die Hochspannung innerhalb der angegebenen Grenzwerte gehalten.
Die für Techniker bestimmte warnende Hinweise im Schaltbild, bezüglich der Röntgenstrahlung sowie die bei jedem Gerät aufgeführten Hochspannungsgrenzwerte sind zu beachten.
Liegen die Hochspannungswerte über den dort aufgeführten Höchstwerten, so muß jedes im Schaltbild spezifizierte Bauteil kontrolliert- und die nötige Abhilfe geschaffen werden.

Viele elektrische und mechanische Teile haben besondere Sicherheitsmerkmale. Bauteile die zu dieser Sicherheitskategorie gehören sind in den Schaltbildern und in der Stückliste dieser Wartungsanleitung sowie in den Nachträgen und Technischen Informationen mit einem ⚠ bzw. * versehen.
Der Einsatz von Ersatzteilen, die nicht den Sicherheitsauflagen, denen die Ersatzteile der Stückliste dieser Anleitung, der dazugehörigen Nachträge und technischen Informationen unterliegen, genügen, kann einen elektrischen Schlag, Brand oder eine übermäßige Röntgenstrahlung zur Folge haben.

ACHTUNG : DIESES GERÄT MUß GEERDET WERDEN !!

CAUTION: HIGH VACUUM PICTURE TUBE

IS DANGEROUS TO HANDLE. REFER PLACEMENT TO QUALIFIED SERVICE PERSONNEL.

EMPLOYS X-RADIATION AND INTEGRAL IMPLOSION PROTECTION. REPLACE WITH A TUBE OF THE SAME TYPE NUMBER AND SUFFIX FOR CONTINUED SAFETY.

X RADIATION WARNING

REPLACEMENT OF CRITICAL COMPONENTS OF THIS APPARATUS (PICTURE TUBE AND OTHERS) CAN RESULT IN EXCESSIVE X RADIATION. THESE COMPONENTS ARE MARKED IN THE SERVICE MANUAL BY AN * .
- REPLACE ONLY WITH CONFORM TYPES;
- SEE SERVICE MANUAL FOR HIGH VOLTAGE ADJUSTMENTS INSTRUCTIONS.

CAUTION: TO DETERMINE THE PRESENCE OF HIGH VOLTAGE, TUBE HIGH VOLTAGES MUST BE DISCHARGED TO CHASSIS.

ACHTUNG

Diese in diesem Gerät entstehende Röntgenstrahlung ist ausreichend abgeschirmt.
Beschleunigungsspannung maximal kV.
Ersatz bestimmter Bauteile kann erhöhte Röntgenstrahlung verursachen.
Diese bauteile sind deshalb in der Bedienungsanleitung mit einen * gekennzeichnet. Nur durch baugleiche Bauteile zu ersetzen!
Zulaß. Nummer: BW/ / /Rö

Serial number:

Beam current:

Date:

EHT:

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- PRECAUTIONS
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- SECTION III : OPERATION
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Vertical frequency range : 45 Hz - 80 Hz divided in 2 ranges :

Range	Minimum frequency	Maximum frequency
LOW	45 Hz	65 Hz
HIGH	60 Hz	80 Hz

Vertical blanking adjustable to minimum 850 µs after leading edge of sync.

1.5 Linearity and geometry

±1% of picture height within 350 x 268 mm area, measured with RETMA Ballchart.

1.6. Raster size regulation

1% measured between 0 and 100 % APL.

2. INPUTS / OUTPUTS

2.1 Analog type inputs

2.1.1 Video

RGB video signals : 0.7 Vpp nominal signals corresponding to RS170.
0.7 V video + 0.3 V sync if sync on green (int. sync).

2.1.2 Sync

Internal sync (sync on green) or external sync (composite or horizontal and vertical sync separate).
If external sync, 4 Vpp nominal amplitude with positive or negative polarity selectable inside.

2.1.3 Connections

Five pairs of BNC connectors, all inputs looped-through connected so that other monitors can be served.

3. CONTROLS AND INDICATORS

3.1 User controls and indicators on control panel

On/off switch.
Brightness : allows adjustment of the background bias level of the picture.
Contrast : allows adjustment of signal drive to the CRT.
Preset positions are possible and factory aligned at 60 nit (if NP tube).

Diagnostic indicators : 2 on the front side.

Degaussing : initiates a full degaussing cycle of the screen, also automatic when switching on the display.

3.2 Controls easy accessible inside display

Blanking, phasing and centering adjustments, amplitude and geometric controls.
Controls to adjust colour chain : 6.

3.3 Service controls

Refer to service manual.

4. POWER SUPPLY

4.1 Power selector

Switched mode high yield type.
Accepts ac voltages from 90 to 130 Vac or 180 to 265 Vac depending on the internal voltage setting.
Mains fuse : 2 A T for U nom.= 220 Vac and 4 A T for U nom. = 120Vac.

4.2 Mains frequency

45 to 65 Hz nominal

4.3 Power consumption

At 100% APL maximum : 150 W.

5. ENVIRONMENTAL CONDITIONS

Unit has no fan.
Requires only free air flow (desktop use or in rackmount).

Operational :

0°C to +40°C
Nominal specs between +10°C and +40°C.
Relative humidity up to 90% non-condensing.
Altitude of 3300 m maximum.

Storage :

-10°C to +60°C.
Altitude : 5000 m maximum.

6. SAFETY REGULATIONS

At the date of manufacturing, the display is made following UL and VDE regulations
X-radiations : PTB / DHHS.
RF-emissions : FCC-A / VDE-A.
More details available on request

7. OPTIONS / VERSIONS

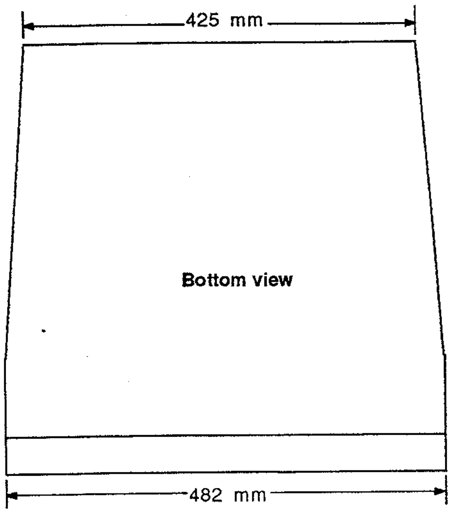
Cabinet version.
Normal persistence phosphors (P22).
Long persistence phosphors short blue.
Tilt and swivel base.
2 - Action optical filter.
Input options :
    Analog-BNC / D-connectors
    TTL-intensifier

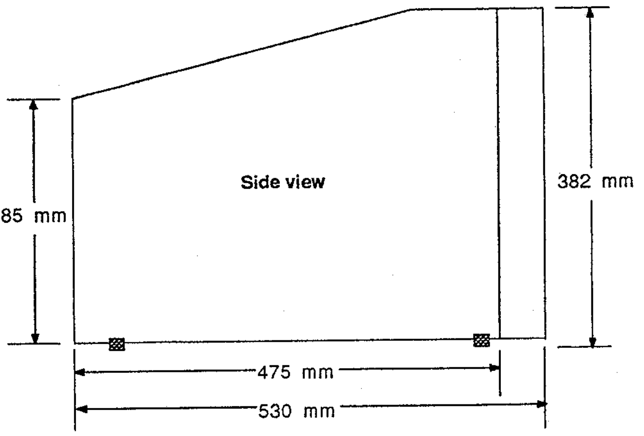
8. DIMENSIONS AND WEIGHT

Dimensions :	Height	382 mm at front side, 282 mm at rear side.
	Width	482 mm.
	Depth	530 mm.
Weight :	Gross	29 kg.

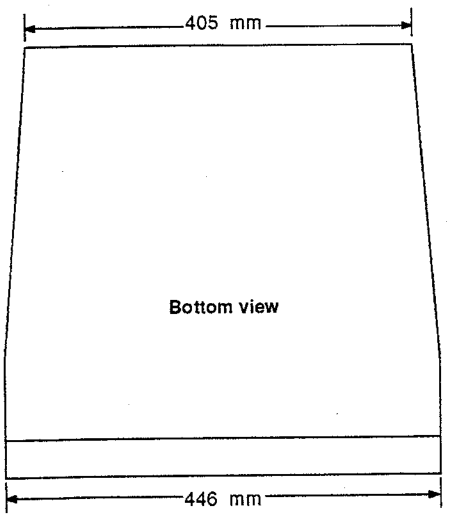
DIMENSIONS CDCT 6000

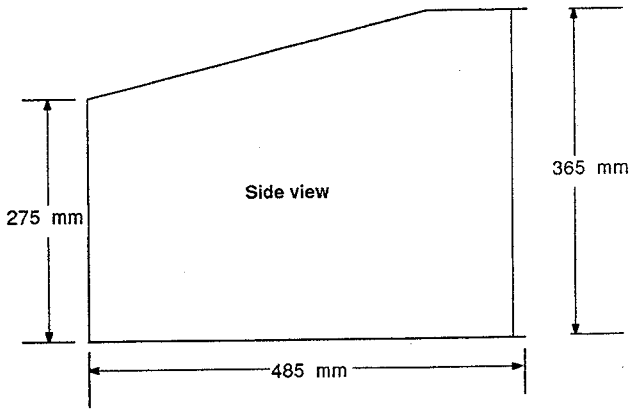
Cabinet


425 mm
Bottom view
482 mm

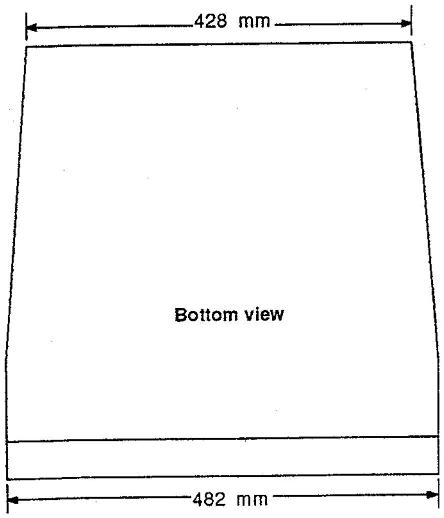

Side view
285 mm
382 mm
475 mm
530 mm

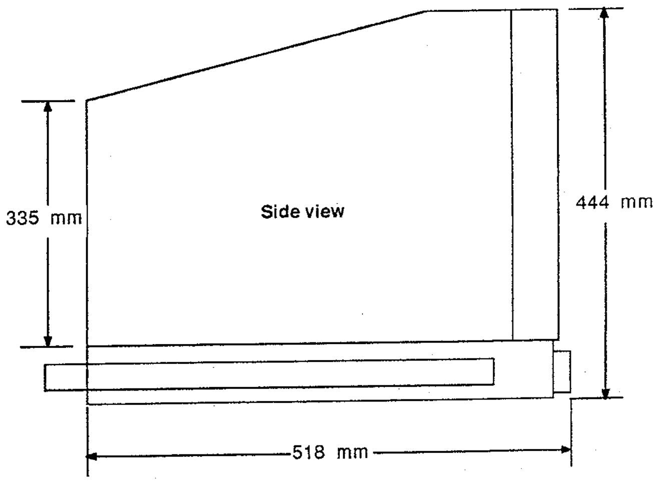
OEM


405 mm
Bottom view
446 mm


Side view
275 mm
365 mm
485 mm

Rack


428 mm
Bottom view
482 mm


Side view
335 mm
444 mm
518 mm

SECTION II : INSTALLATION

Introduction

This section contains information and instructions for installing the display.

WARNING

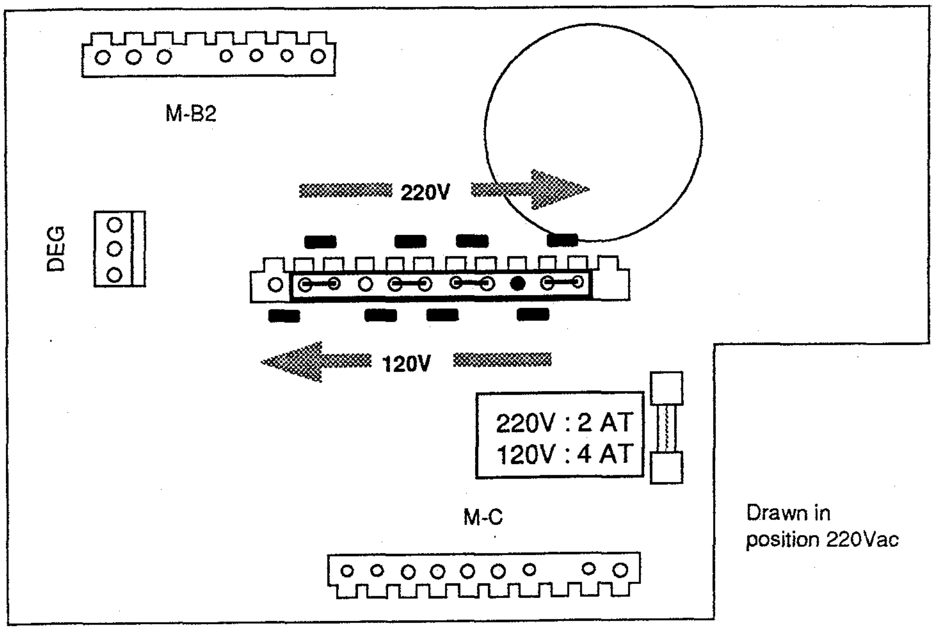
Read the Service Safety Precautions
at the front of this manual
before starting the adjustments.

All the connections are located at the rear of the display.

1. POWER

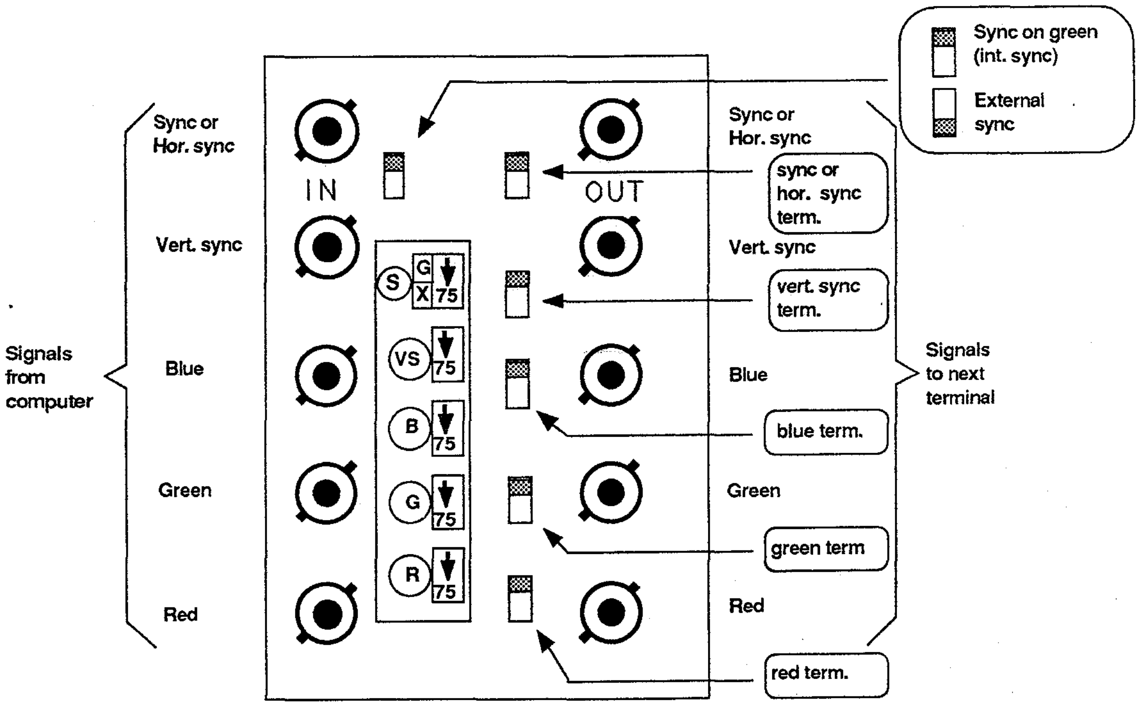
Check if your AC power source voltage corresponds to the appropriate power input voltage for the display, noted on the rear side of the display.

The ac power voltage selector is situated on the MAINS INPUT board,behind the mains input connector, and has two positions, one for 120 Vac and one for 220 Vac.
Pull the voltage selector plug and replug it in the (shifted) position to select the other mains input voltage see next figure.



Correct the AC power voltage noted on the rear side of the display.

2. SIGNAL CONNECTIONS

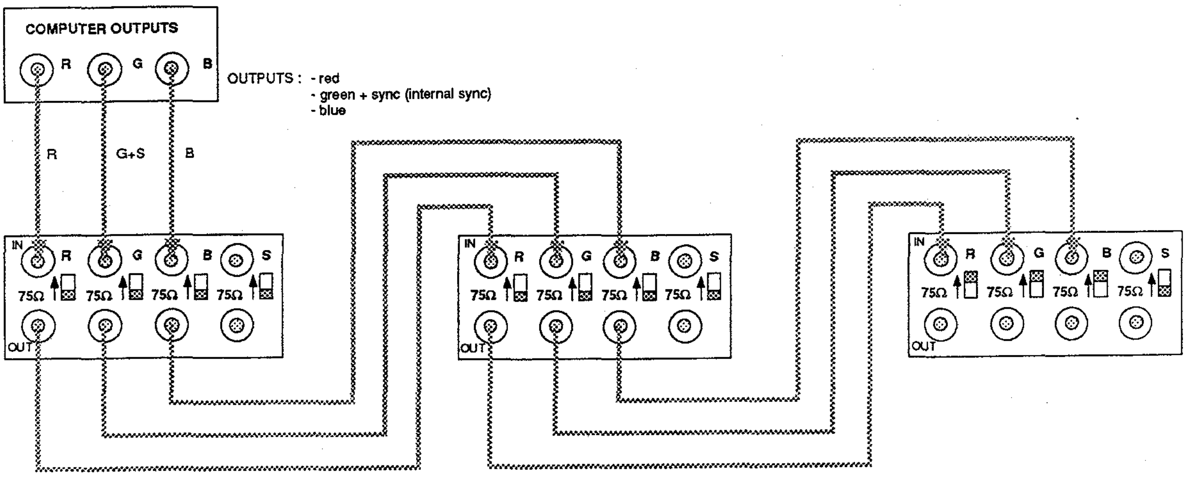

Sync on green (int. sync)
External sync
Signals from computer
Sync or Hor. sync
Vert. sync
Blue
Green
Red
IN
OUT
S
G
X
75
VS
75
B
75
G
75
R
75
Sync or Hor. sync
sync or hor. sync term.
Vert. sync
vert. sync term.
Blue
blue term.
Green
green term
Red
red term.
Signals to next terminal

SYNCHRONISATION MODE :

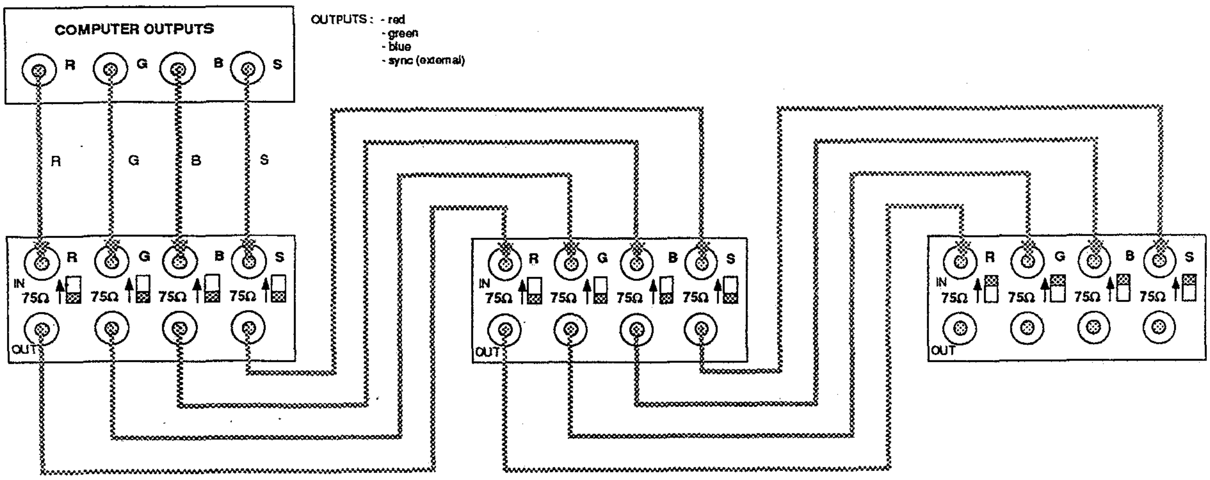
- **Internal sync**(or sync on green): the sync signal is combined with the green input video signal.
- **External sync**,here two possibilities :
  - Composite sync (line and field sync signals are combined).
  - Separate line and field sync signals.

Depending on the computer outputs, 3 or 4 cables, two connection methods are given in following diagrams.

SIGNAL CONNECTIONS (3 CABLES)


COMPUTER OUTPUTS
R
G
B
OUTPUTS : - red
- green + sync (internal sync)
- blue
R
G+S
B
IN
R
G
B
S
75Ω
75Ω
75Ω
75Ω
OUT
IN
R
G
B
S
75Ω
75Ω
75Ω
75Ω
OUT
IN
R
G
B
S
75Ω
75Ω
75Ω
75Ω
OUT

SIGNAL CONNECTIONS (4 CABLES)



Note : In some exceptional cases 5 outputs are foreseen ; red-, green-, blue-, hor. sync and vert. sync output. One can follow the same procedure as shown in the diagram for 4 cables while a fifth cable connects the vertical sync connectors.

On the printed circuit board of the input module, 2 switches are mounted which permit switching from “Pos” to “Neg” polarity (one for hor. / comp. sync and one for vert. sync).

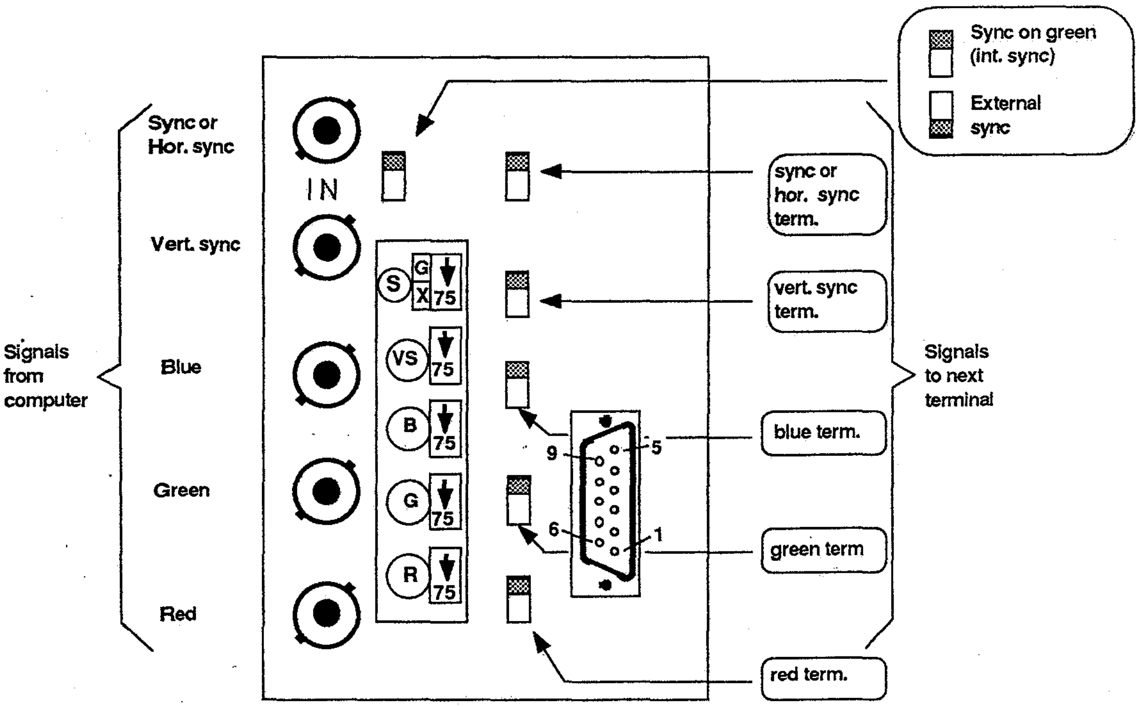
2. BNC / D input :

This unit permits an input of the different signals via BNC connectors or via a 9 pins D-connector.
If the D-connector is used one can connect another display via the BNC connectors
NOTE : Be sure that the connectors of the last display are terminated (switches in 75Ω position) even when the D-connector is used.

On the printed circuit board are 2 bridges mounted which permit "Pos" or "Neg" polarity switching of the sync.

D-connector pin lay-out :

1. "R" input
2. "G" input
3. "B" input
4. "Sync" input
5. not connected
6. earth "R" input
7. earth "G" input
8. earth "B" input
9. earth "Sync" input


Sync on green (int. sync)
External sync
Sync or Hor. sync
Vert. sync
Blue
Green
Red
Signals from computer
IN
S
G
X
75
VS
B
G
R
sync or hor. sync term.
vert. sync term.
blue term.
green term
red term.
Signals to next terminal
9
5
6
1

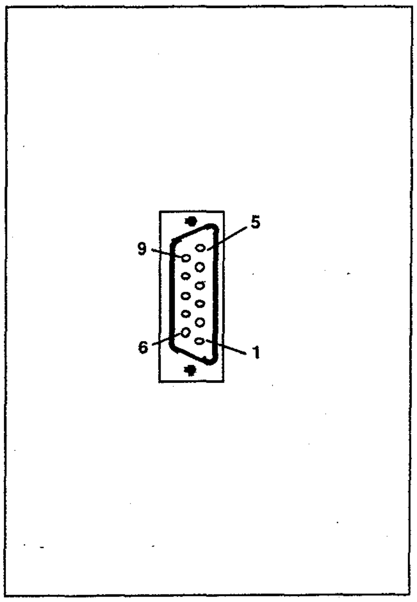
3. *TTL INPUT*

The signals are connected to the display via a 9 pins D-connector with following pin lay-out :

1. earth connection
2. earth connection
3. "R" input
4. "G" input
5. "B" input
6. intensity
7. not connected
8. horizontal sync input
9. vertical sync input

On the printed circuit board of this unit are 2 switches mounted :

S1 Input polarity of the R G B signals.
S2 High / variable intensity.



3. READJUSTMENT FOR ANOTHER SCANNING RATE

LINE FREQUENCY

In raster scan display technology, the line frequency or horizontal scan frequency is the number of times per second that a fixed vertical line in the picture is crossed in one direction by the scanning spot.

Determination of the line frequency for a non-interlaced system :

Formula : number of lines x field frequency.

Example : A display will be connected to a non-interlaced system with 525 lines and a field frequency of 50Hz.
This gives a line frequency of 26250 Hz or 26.25 kHz.

Determination of the line frequency for an interlaced system :

Formula : (number of lines x field frequency) / 2.

If the line frequency is unknown, measure the period H.PERIOD between subsequent line sync pulses by means of an oscilloscope.

The corresponding line frequency is:

Formula : H.FREQ = 1 / H.PERIOD

Example : If the measured period is 64 µs, the line frequency is 15625 Hz.

This display can handle line frequencies from 15 kHz up to 25 kHz.

FIELD FREQUENCIES

In raster scan display technology, the field frequency or vertical scan frequency is the product of frame frequency (or picture frequency) and the number of fields in one frame, a frame being the total area of the picture which is scanned while the picture signal is not blanked.

- In a non-interlaced system, field and frame frequency are equal.
- In an interlaced system, the number of fields in one frame is two.

Note: interlaced scanning is a process in which the distance from center to center of successively scanned lines is a multiple (usually two) of the nominal line width, and in which adjacent lines belong to successive fields.

If the field frequency is unknown, measure the period V.PERIOD between subsequent field sync pulses by means of an oscilloscope.

The corresponding field frequency is:

Formula : V.FREQ = 1 / V .PERIOD.

Example : If the measured period is 16.66 ms, the field frequency is 60 Hz.

This display can handle field frequencies from 45 Hz up to 80 Hz.

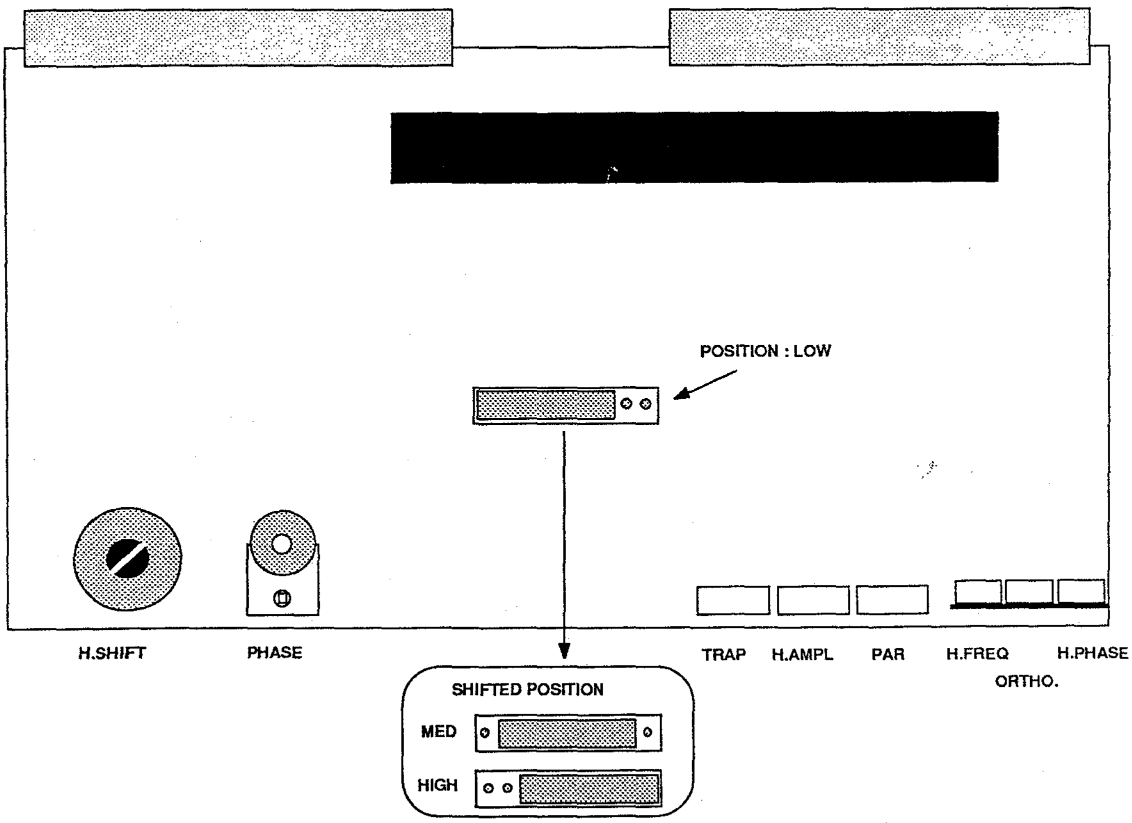
Check now the field frequencies of your video input signals.

HORIZONTAL SCAN RANGE SETTING

The horizontal scan frequency range is divided into 3 ranges :

Range	Minimum frequency	Maximum frequency
LOW	15 kHz	18.2 kHz
MEDIUM	18.2 kHz	21.4 kHz
HIGH	21.4 kHz	25 kHz

Set the horizontal scan range by means of the corresponding jumper (CON.2) on the HORIZONTAL DEFLECTION board see next figure.

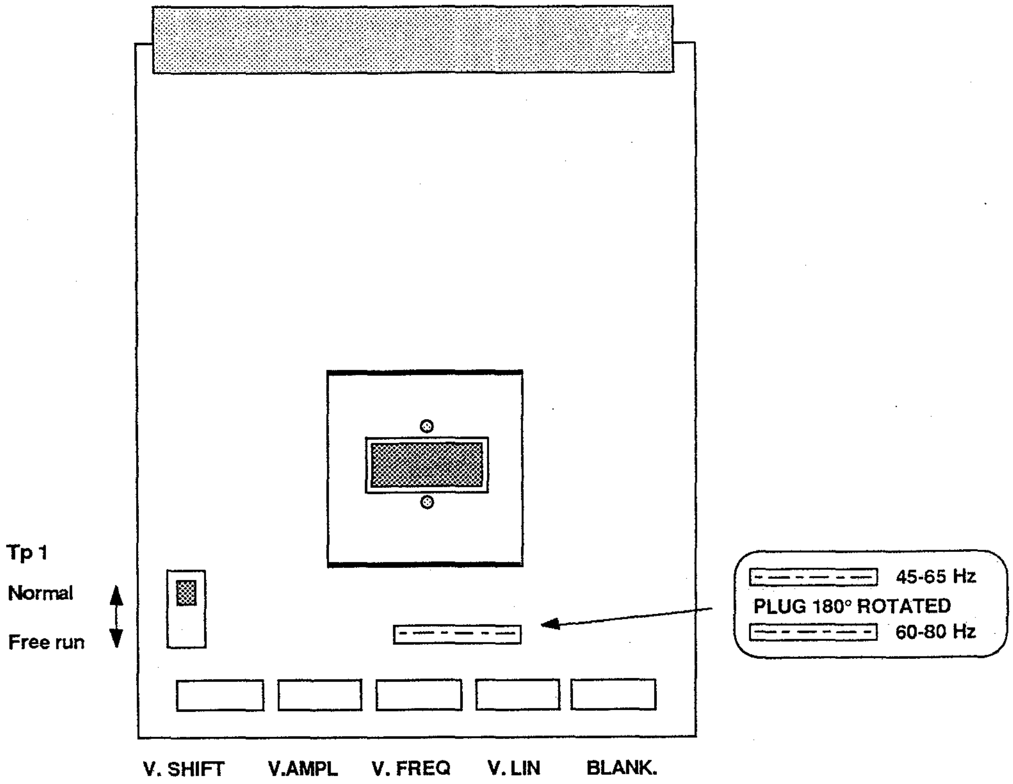

POSITION : LOW
H.SHIFT
PHASE
TRAP
H.AMPL
PAR
H.FREQ
H.PHASE
ORTHO.
SHIFTED POSITION
MED
HIGH

VERTICAL SCAN RANGE SETTING

The vertical scan frequency range is divided into 2 ranges :

Range	Minimum frequency	Maximum frequency
LOW	45 Hz	65 Hz
HIGH	60 Hz	80 Hz

Select the vertical scan range by turning the jumper plug, see next figure.



READJUSTMENT

LINE FREQUENCY

Short circuit to ground testpoint TP1 on board 2 (HOR. DEFLECTION).
Adjust P5 (H.FREQ) on board 2 to get a minimum horizontal beat on the screen.
Remove the short circuit to ground of testpoint TP1.

FIELD FREQUENCY

Short circuit Tp on board 5 (VERTICAL DEFLECTION).
Adjust P1 (V.FREQ) on board 5 to obtain an upwards vertical beat on the screen of approximately 3 times per second.
Remove the short circuit.

GEOMETRY

Apply a cross hatch / dot video signal (or an other suitable pattern for geometry adjustment).
Adjust now :

HORIZONTAL PHASE	with P6 (PHASE) on board 2 (HOR. DEFL.),
HORIZONTAL AMPLITUDE	with P3 (SIZE) on board 2 (HOR. DEFL.) (WIDTH 360mm),
VERTICAL AMPLITUDE	with P2 (AMPL.) on board 5 (VERT.DEFL.) (HEIGHT 270mm),

NOTE : The other geometry adjustments are factory set for optimal results. Do not touch them unless necessary and follow the adjustment procedure described in the technical manual.

SECTION III : OPERATION

Introduction

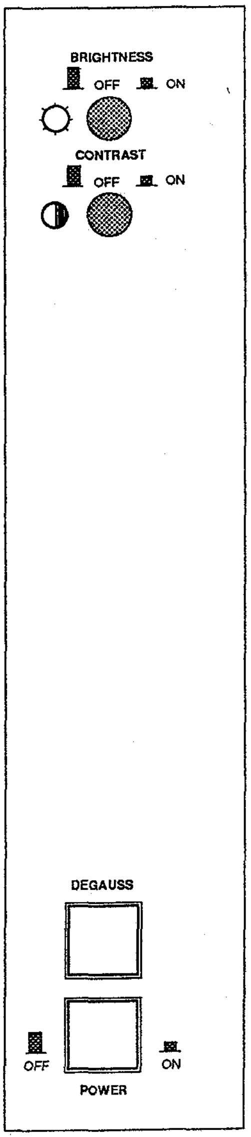
This section provides functional identification of exterior indicators and operation controls.

1. FRONT INDICATORS

ON	This red LED illuminates when the display is switched on.
SG	SAFE GUARD, this yellow LED illuminates when the display is switched to safety mode.

2. FIRST ORDER CONTROLS

Note : The operation controls are situated at the right side of the display.
The first order controls POWER and DEGAUSSING are easily accessible.
The second order controls BRIGHTNESS and CONTRAST are situated behind a protection door.



POWER	Switches power on (pushed) and off (released). The red LED in the bezel illuminates when switched on.
DEGAUSS	When switching on the display, automatic degaussing is obtained. The manual degaussing pushbutton makes immediate degaussing possible, without having to switch off the display. Therefore hold the button in its pushed position until visible interference on the screen disappears.
Note :	After manual or automatic degaussing, please wait a few minutes before reactivating; only in this way effective degaussing is obtained.

3. SECOND ORDER CONTROLS

BRIGHTNESS	Pulled position : this control can be used to adjust the brightness of the display. Pushed position : calibrated brightness position.
CONTRAST	Pulled position : this control can be used to adjust the contrast of the display. Pushed position : calibrated contrast position.

SECTION IV : PRINCIPLES OF OPERATION

INTRODUCTION

This section contains functional descriptions keyed to the overall simplified block diagram of the circuit groups that appears at the end of this section.

For simplicity, this block diagram does not show circuit details. Schematics are located in SECTION VII. Each block is drawn as a rectangular with the board identification character in the right-hand bottom corner.

VIDEO AMPLIFIER

The red, green and blue video input signals enter the display via the input board $\boxed{7}$. Several types of input boards exist dependent on the specifications of the input signals (analog or TTL, BNC or 9 pins D-type input connectors). They all deliver a similar red, green and blue video signal that is contrast adjusted on board $\boxed{9}$ by means of a differential amplifier of which the gain depends on the contrast DC control voltage coming from the control panel $\boxed{12}$.

Next, also on board $\boxed{9}$, a brightness pulse is added to these three video signals at the position of the back porch or the sync pulse (depending on back porch or sync tip clamping selected on board $\boxed{6}$).
The level of this brightness pulse is controlled by means of the brightness DC control voltage coming from the control panel $\boxed{12}$.

After gain control (HIGH LIGHT ADJUST) on board $\boxed{3}$, a black level pulse is inserted at the position of the brightness pulse on the three video signals. This black level pulse is also level controlled for setting cut off (LOW LIGHT ADJUST).

The three video signals are clamped (DC restored) in the hard clamper on board $\boxed{3}$, compensating for eventual hum on the video input signal.
Finally, three cascode amplifier stages bring the video signals to a sufficient level for driving the picture tube cathodes.
Soft clamping sets these drive signals to a fixed and stable DC level, independent of picture content. Because of the adjustable brightness and black level pulse of which the top is set fixed now in DC, the CRT drive signal shifts in DC level when changing the brightness or cut off (LOW LIGHT) adjustment.

SYNCHRONISATION, CLAMPING AND BLANKING

The vertical sync signal triggers the vertical oscillator on the VERTICAL DEFLECTION board $\boxed{5}$. Dependent on the applied input signal and what kind of input board used, this vertical sync signal may come directly from the separate vertical sync input (VS), after sync separation from a combined horizontal/vertical sync signal or after separation from a green video composite input signal (sync on green).
Vertical sync separation is executed on the SYNC PROCESSOR board $\boxed{6}$.

The horizontal sync pulse may come from the combined horizontal/vertical sync input (S) or after separation from the green video composite input signal (sync on green).

The horizontal sync can be delayed on board $\boxed{6}$ to improve horizontal picture position on the screen, clamping and blanking in case of non standard video input signals (e.g. no back porch).

If a sync input signal is present, the horizontal sync signal is used as a reference for generating clamping pulses: the brightness pulse, the black level pulse, the hard clamp pulse and the soft clamp pulse.

In absence of sync, a line flyback pulse takes over the reference function on board $\boxed{6}$. If a clamping pulse fails, the same thing happens on board $\boxed{3}$ to achieve correct clamping in the final video amplifiers.

A horizontal sync pulse with constant duration is formed on the SYNC PROCESSOR board $\boxed{6}$ and applied to the horizontal scan oscillator and deflection drive circuits on the HORIZONTAL DEFLECTION board $\boxed{2}$.

A blanking pulse is generated on the RGB OUT board $\boxed{3}$, derived from horizontal and vertical flyback pulses and fed to the G1 picture tube grid for blanking the retrace spot.

SAFE GUARD

When no sync input signal or no horizontal or no vertical deflection is present, the safe guard circuit illuminates a LED on the bezel and switches off the EHT supply for safety reasons and in order to protect the picture tube. It is possible for maintenance actions to switch off this protection on board $\boxed{1}$ (no sync input detection only).

POWER SUPPLY

The mains voltage is filtered at the input. Via the on/off switch, the mains voltage arrives at the MAINS INPUT board $\boxed{10}$ which is different for a 120Vac and a 220Vac version .

Next a switched mode power supply delivers all DC supply voltages for the display (board $\boxed{4}$ different for a CDCT 6151 and a CDCT 6351), with overload and overvoltage protection.

EHT SUPPLY

The EHT SUPPLY board $\boxed{1}$ delivers a stable high voltage, focus and G2 grid supply with several protections build in as an adjustable beam current limit and an EHT limiter circuit that blocks the switched mode power supply on board $\boxed{4}$ in case of a too high EHT.

DEFLECTION

The vertical sync pulse triggers the TDA1170SH integrated circuit on board $\boxed{5}$,used as oscillator, sawtooth generator and deflection amplifier driving the vertical deflection coils. An adjustable DC current determines the vertical shift.

The horizontal sync pulse synchronizes the line oscillator in a TDA2593 integrated circuit also containing a phase comparator and line drive circuit for the horizontal deflection output amplifier.
A scan voltage regulator on board $\boxed{2}$ delivers the power supply for the horizontal deflection output, this is a DC voltage modulated and controlled for geometry corrections by means of a separate integrated circuit TDA4610.

SECTION V: ADJUSTMENTS

INTRODUCTION

This section contains a step-by-step procedure for adjusting the CDCT 6151 and CDCT 6351. For best results, follow this procedure in the same order as listed below.
At the end of this SECTION V, a page is included with locations of boards and adjustments. Unfold this page before starting the procedure.

TEST EQUIPMENT REQUIRED

A high-impedance digital voltmeter.
A wide-and oscilloscope (min 50 Mhz bandwidth)
A video signal generator with appropriate line and field frequency
  - at least a cross hatch and white flat field are necessary.
A frequency sweep with range up to 25 Mhz.
A colour analyser.

ADJUSTMENT PROCEDURE

WARNING

Read the Service Safety Precautions
at the front of this manual
before starting the adjustments

Check for correct installation of the display with regard to mains voltage and input signal specifications (see SECTION II).

Disconnect the power.

Remove the top and rear cover from the display.

Apply power again and an input signal as to obtain a picture on the screen.

1. POWER SUPPLY ADJUSTMENT

The correct adjustment of P1 (VOLTAGE ADJUST) on board $\boxed{4}$ (SWITCHED MODE POWER SUPPLY) is utmost important to obtain correct supply voltages, correct EHT voltage and safe X-ray radiation limits.
P1 is factory sealed with V395140. Do not attempt to defeat the sealing or to reset P1 unless according to the following instructions:

a) Replacement of any component on board $\boxed{4}$ must be followed by a measurement at board contact B22 (cathode D16) of +140Vdc (+/-2%) if a CDCT 6151 or +120Vdc (+/-2%) if a CDCT 6351, adjustable by means of P1 on board $\boxed{4}$.

b) If voltage measured under (a) is not correct, replacement, readjustment and resealing of P1 becomes mandatory.

- Replace P1 by an unsealed device of exactly the same type.
- Connect a voltmeter (precision 1%) to board contact B22 (cath. D16).
- Adjust P1 to obtain +140Vdc if a CDCT 6151 or +120VdC if a CDCT 6351 (brightness and contrast adjusted to obtain a normal picture).
- Seal P1 with V395140 (SICOMET 8300).

2. HIGH-VOLTAGE ADJUSTMENT

2.1. EHT

Correct adjustment of P3 (EHT LIMIT ADJUST) and P6(EHT ADJUST) on board $\boxed{1}$ (EHT SUPPLY) is utmost important to obtain correct EHT voltage and safe X-ray radiation limits.
P3 and P6 are factory sealed with C395140. Do not attempt to defeat the sealing or to reset P3 or P6.

- Replace P3 and P4 by an unsealed device of exactly the same type.
- Switch off the display.

WARNING

A very high voltage remains present
at the picture tube anode connection
even a long period after the display
has been switched off.

- Connect a high-voltage meter under the EHT anode cap; be sure of a good ground connection.
- Switch on the display.
- Adjust P3 in maximum position.
- Adjust P6 for +27kVdc.
- Adjust P3 till the switched mode power supply switches to safety mode.
- Adjust P6 for +24kVdc.

- Switch off the display.
- Remove the high-voltage meter.
- Seal P3 and P6 with V395140 (SICOMET 8300).

2.2. FOCUS ADJUSTMENT

Set P4 (FOCUS) on board $\boxed{1}$ (EHT SUPPLY) for a picture on the screen as sharp as possible.

3. SYNCHRONISATION

First set the switches S1 (SYNC DELAY) and S2 (SYNC TIP CLAMPING/ BACK PORCH CLAMPING) on board $\boxed{6}$ (SYNC PROCESSOR) in the correct position depending on the specifications of your video input signal.

The normal positions are: S1 in position NON-DELAYED and
S2 in position BACK PORCH CLAMPING.

The potentiometer P3 (BRIGHTNESS PULSE WIDTH) also on board $\boxed{6}$ is factory set for maximum width of the brightness pulse. Clamping problems may occur if this pulse is to wide for your application, so if necessary modify the setting of P3 now.

3.1. HORIZONTAL OSCILLATOR FREQUENCY

Short circuit to ground testpoint TP1 on board $\boxed{2}$ (HORIZONTAL DEFLECTION).
Adjust P5 (H.FREQ) on board $\boxed{2}$ to get a minimum horizontal beat on the screen.
Remove the short circuit to ground of testpoint TP1.

3.2. VERTICAL OSCILLATOR FREQUENCY

Short circuit testpoint TP on board $\boxed{5}$ (VERTICAL DEFLECTION).
Adjust P1 (V.FREQ) on board $\boxed{5}$ to obtain an upwards vertical beat on the screen of approximately 3 times per second.
Remove the short circuit.

4. GEOMETRY

4.1 OVERSCAN LIMIT

Connect an oscilloscope to the collector of Q3 on board $\boxed{2}$ (HORIZONTAL DEFLECTION).
Set potentiometer P3 (HORIZONTAL AMPLITUDE) on board $\boxed{2}$ for flyback pulses of 1600Vpp if a CDCT 6151 or 1300Vpp if a CDCT 6351.
Adjust P7 (OVERSCAN LIMIT) on board $\boxed{2}$ till limitation starts.

4.2. BLANKING

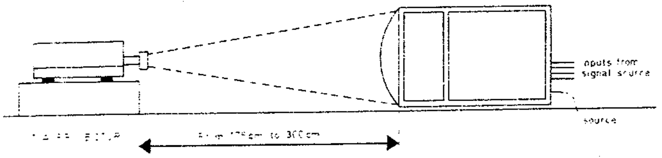
Adjust the horizontal blanking by means of P10 (HORIZONTAL BLANKING WIDTH) on board $\boxed{3}$ (RGB OUT). If the horizontal blanking time is too short, the left side of the picture will be brighter; if too long, left picture contents will disappear.

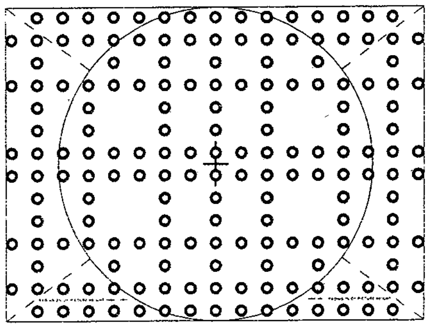
Adjust the vertical blanking by means of P4 (V.BLANK) on board $\boxed{5}$ (VERTICAL DEFLECTION). Incorrect duration will give visible retrace lines or partial blanking of picture contents at the top of the screen.

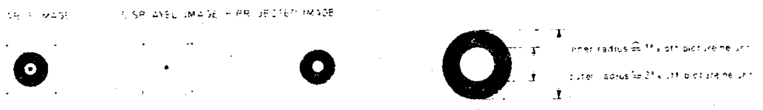
4.3. GEOMETRY

The factory setting of picture geometry has been executed by means of the available display adjustments, matching on the screen, a displayed cross hatch/dot video signal with a corresponding projected slide.
It is suggested that this method of geometry adjustment is followed in order to meet specifications.

Next figures show the equipment set up for geometry adjustment and an example of a slide. Note that the used slide must correspond to the test signal pattern displayed on the screen.

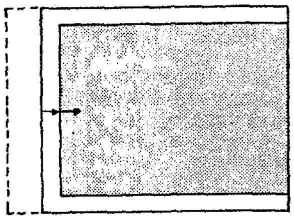


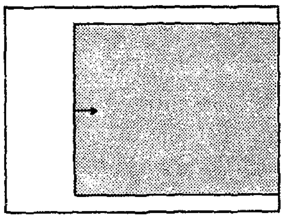


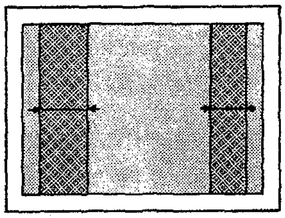


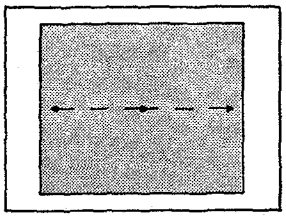
Before starting the geometry adjustment, ensure the hole monitor is demagnitized.

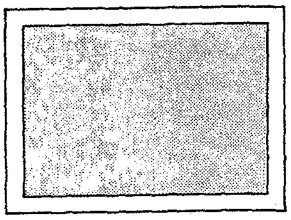
Adjust now: HORIZONTAL AMPLITUDE with P3 on board $\boxed{2}$ (WIDTH 360mm)
HORIZONTAL LINEARITY with L1 on board $\boxed{2}$
HORIZONTAL SHIFT with P1 on board $\boxed{2}$
HORIZONTAL PHASE with P6 on board $\boxed{2}$
TRAPEZIUM CORRECTION with P2 on board $\boxed{2}$
SIDE PIN CUSHION CORRECTION (PAR.) with P4 on board $\boxed{2}$
VERTICAL AMPLITUDE with P2 on board $\boxed{5}$ (HEIGHT 270mm)
VERTICAL LINEARITY with P3 on board $\boxed{5}$
VERTICAL SHIFT with P5 on board $\boxed{5}$

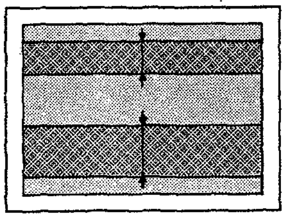

HORIZONTAL SHIFT

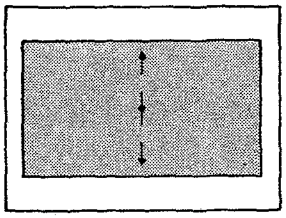

HORIZONTAL PHASE

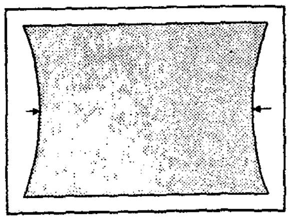

HORIZONTAL LINEARITY


HORIZONTAL AMPLITUDE

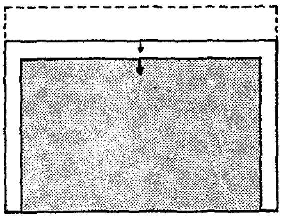

NORMAL DISPLAY

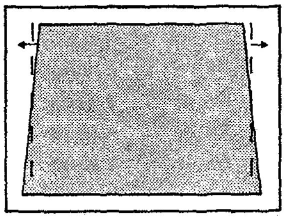

VERTICAL LINEARITY


VERTICAL AMPLITUDE


SIDE PIN CUSHION

DISPLAY
CORRECTIONS


VERTICAL SHIFT


TRAPEZIUM CORRECTION

5. WHITE BALANCE

Apply to the red, green and blue input a white window input signal of correct line and field frequency, switchable between 0% (black), 10% and 100% white. Do not forget to terminate the inputs on 75 Ohm.
Install a colour analyser calibrated for the type of phospors used in this display and for a colour temperature of 9300°K (or use another suitable luminance measurement instrument).

Set contrast and brightness control on the front panel in calibrated position (pushed in).

Apply the white window signal with level 10%.
Turn P7, P8 and P9 (LOW LIGHTS or CUT OFF controls of the red, green and blue video amplifiers) completely to the right (clockwise).
Adjust P5 (VG2 ADJUST) on board $\boxed{1}$ (EHT SUPPLY) for a light output of 0.1 Nit for the most bright colour on the screen (to be measured with a colour analyser).

Note: 1 Nit = 1 candela/square meter = 0.292 foot-Lambert (ftL)
1 foot-lambert = 3.43 Nit = 3.43 candela/square meter

Adjust P7, P8 and P9 on board 3 (RGB OUT) for 0.6 Nit light output for the red, green and blue signals.

Apply the 100% white window video signal.
Adjust P1, P2 and P3 (HIGH LIGHTS or GAIN controls) on board $\boxed{3}$ for a light output for the three colours of :
30 Nit for a high resolution tube with long persistance.
60 Nit for a high resolution tube with standard persistance.

Repeat the adjustments of P7, P8 and P9 again and afterwards these of P1, P2 and P3. Do not touch the VG2 adjustment.

6. CURRENT LIMIT ADJUST

Potentiomer P1 (CURRENT LIMIT ADJUST) on board $\boxed{1}$ (EHT SUPPLY) is factory adjusted and set for the lowest maximum beam current possible (most safe protection - P1 turned maximum in clockwise direction).

7. WHITE UNIFORMITY

Apply a white flat field video signal to all three signal inputs.
Adjust P2 (WHITE UNIFORMITY) on board $\boxed{1}$ (EHT SUPPLY) for a picture as uniform white as possible.

8. FREQUENCY RESPONSE

Apply a video sweep signal of 25 Mhz bandwidth to the red, green and blue input.
Connect an oscilloscope to the red, green or blue output (CRT-cathode).
A low capacity input probe (typ. 2pF) must be used.

All following adjustments are located on board $\boxed{3}$ (RGB OUT).

Turn P4, P5 and P6 completely anti clockwise.
Adjust L4, L5 and L6 to have a peak amplitude just above 20 Mhz on the corresponding cathodes (red, green and blue).

Adjust C28, C29 and C30 for a frequency response as flat as possible to approximately 10 Mhz on the corresponding cathodes (red, green, blue).

Adjust P4, P5 and P6 for a peak amplitude as small as possible on the corresponding cathodes (red, green, blue), resulting in a flat frequency response up to 20 Mhz.

SECTION VI: REPLACEABLE PARTS

INTRODUCTION

This section contains information to determine order numbers by means of exploded views and corresponding parts lists.

List of the different exploded views in this section:

- Exploded view of outside hardware.

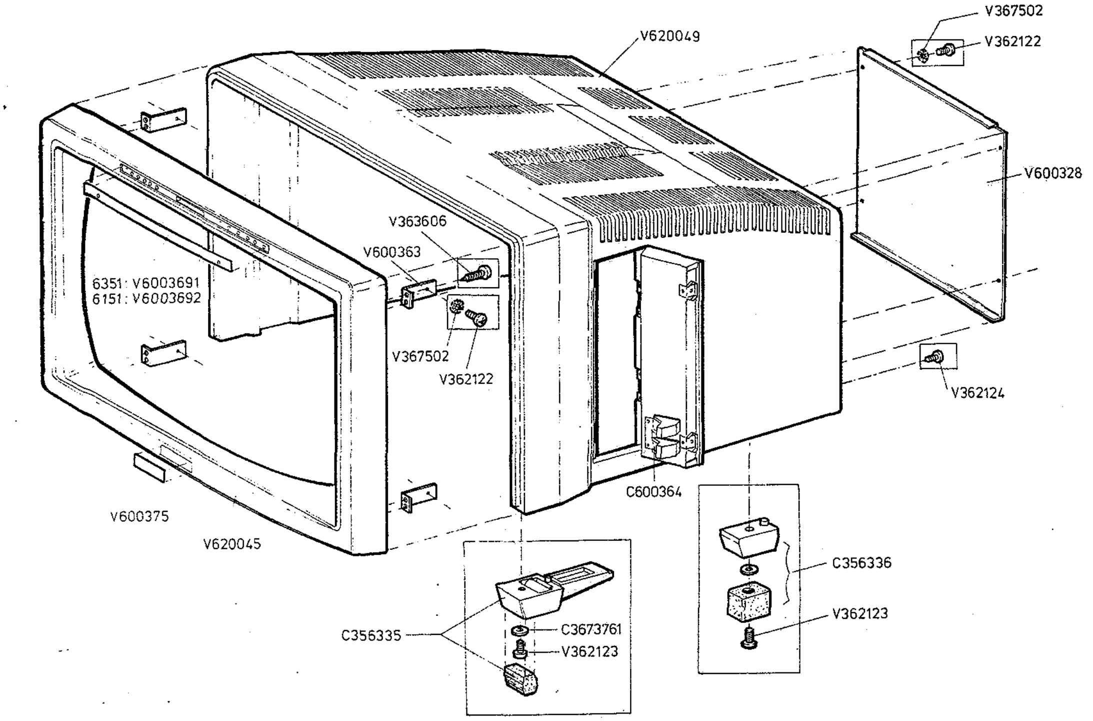
- Exploded views of inside display hardware:

  1. Exploded view of the CONTROL PANEL mounting.
  2. Exploded view 1 of the SIGNAL PROCESSING side.
  3. Exploded view 2 of the SIGNAL PROCESSING side.
  4. Exploded view 1 of the POWER INPUT / CRT CONNECTION.
  5. Exploded view 2 of the POWER INPUT.
  6. Exploded view 1 of the POWER & DEFLECTION side.
  7. Exploded view 2 of the POWER & DEFLECTION side.
  8. Exploded view of the CRT mounting.

At the end of this section are printed:

- Matrix of picture tubes (all CDCT 6151 and CDCT 6351 versions).
- Matrix of non common parts (all CDCT 6151 and CDCT 6351 versions).
- Recommended kit of modules for CDCT 6151 and/or CDCT 6351 versions.
- Recommended kit of semiconductors for CDCT 6151 and/or CDCT6351.

EXPLODED VIEW OF OUTSIDE HARDWARE

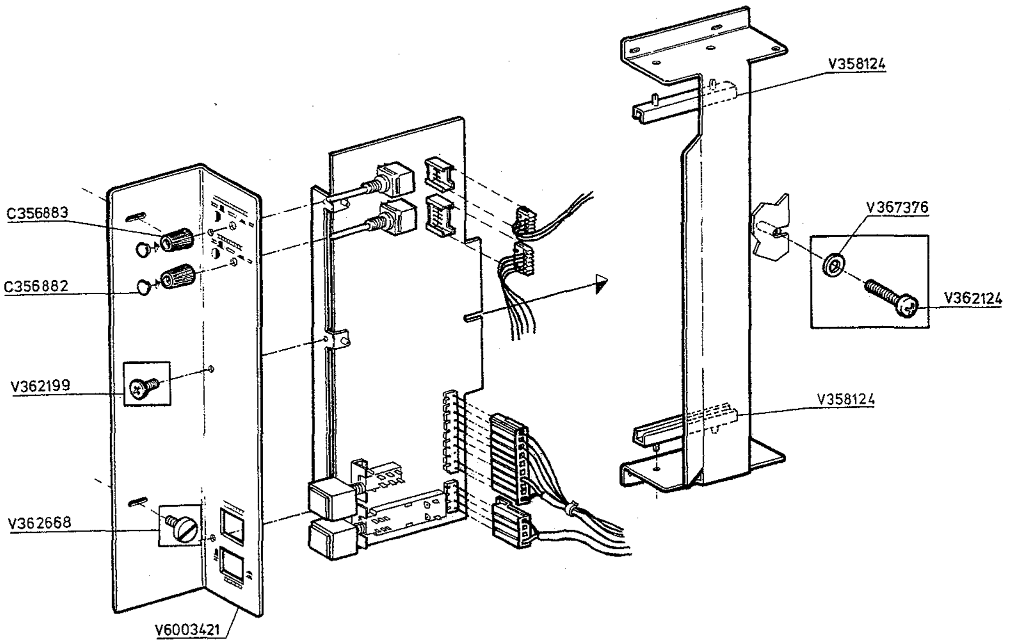

V367502
V362122
V620049
V600328
V363606
V600363
6351: V6003691
6151: V6003692
V367502
V362122
V362124
C600364
V600375
V620045
C356336
V362123
C356335
C3673761
V362123

PARTS LIST

Order number	Description	
C356335	FOOT TURN CM22	
C356336	FOOT CM22	
V362122	SMP+M M3x8 D7985	
V362123	SMP+M M3x10 D7985	
V362124	SMP+M M3x12 D7985	
V363606	SMP+C 3.5x16 D7981	
C3673761	WASHER PA 3.2 D9021	
C367502	WASHER LA 3.2 D6798	
V600328	REAR COVER CDCT6151/6351	
V600363	BEZEL BRACKET	
V600364	KNOB SPRING	
V6003691	NAME PLATE CDCT6351	
V6003692	NAME PLATE CDCT6151	-> 5902002
V600375	LOGO PLATE CDCT6000 (BARCO-INDUSTRIES)	V6007691
V620045	BEZEL CDCT6000 (WITHOUT DECORATIVE PLATES)	
V620049	TOP COVER (COMPLETE WITH DOOR)	

EXPLODED VIEWS OF INSIDE DISPLAY HARDWARE

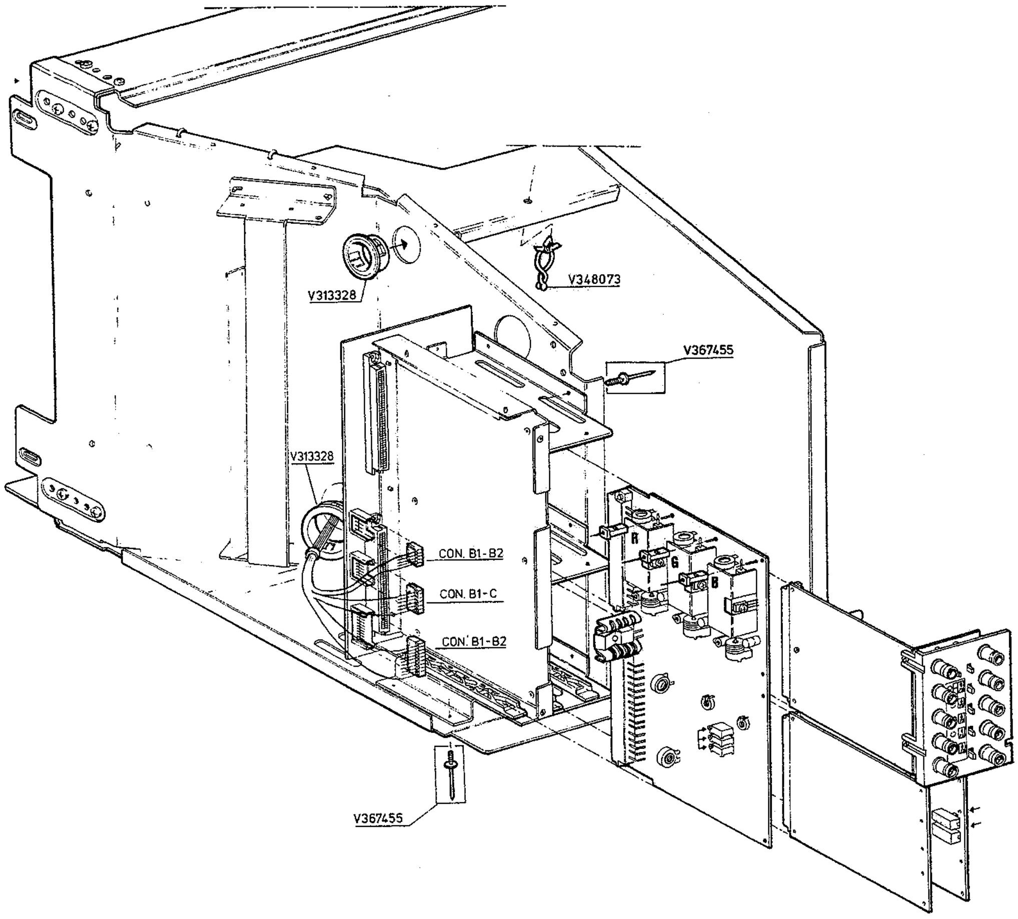
1. EXPLODED VIEW OF THE CONTROL PANEL MOUNTING


V358124
C356883
V367376
C356882
V362124
V362199
V358124
V362668
V6003421

PARTS LIST

Order number	Description
C356882	CAP TURN KNOB D11 GRAY
C356883	KNOB TURN D11 BLACK
V358124	PCB GUIDE L63
V362124	SMP + M M3x12 D7985
V362199	SMP+ M3x8 COMBI-SCREW
V362668	SMP M M3x6 D921
V367376	WASHER PB 3.2 D125
V6003421	CONTROL PANEL 6351

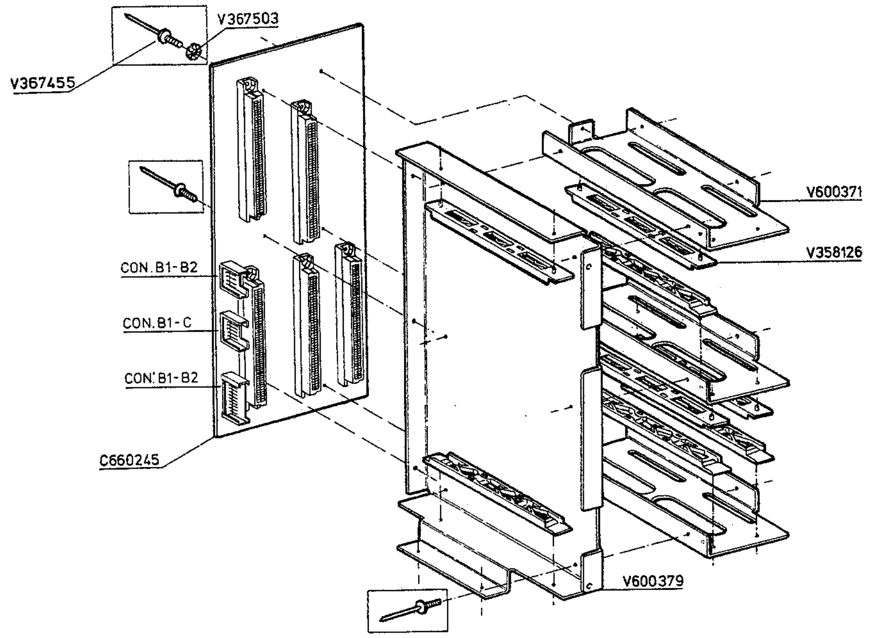
2. EXPLODED VIEW 1 OF THE SIGNAL PROCESSING SIDE


V348073
V313328
V367455
V313328
CON. B1-B2
CON. B1-C
CON. B1-B2
R
G
B
V367455

PARTS LIST

Order number	Description
V313328	BUSHING SNAP 38MM
V348073	CABLECLIPS TWIST
V367455	RIV.P FE D3.2 L 4.8

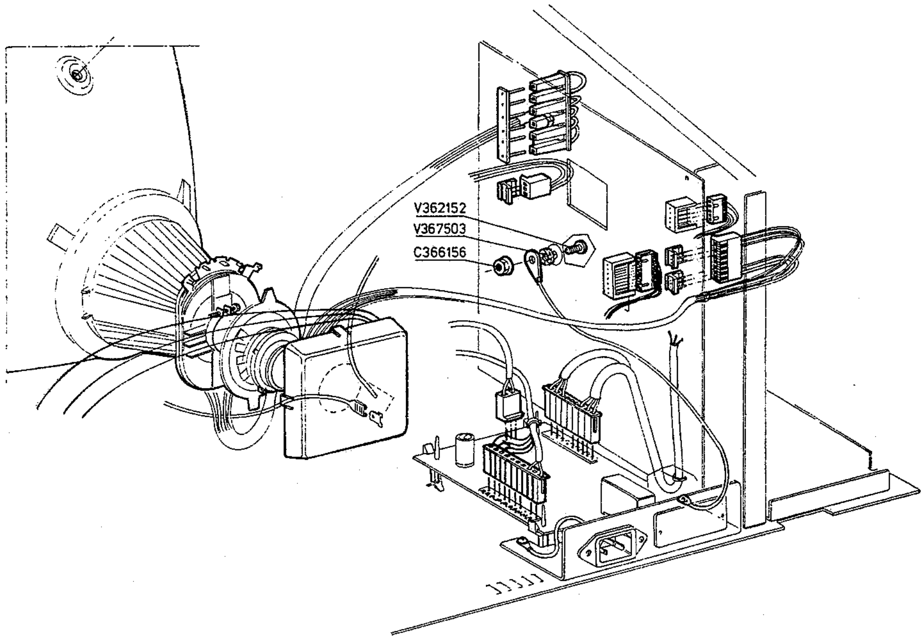
3. EXPLODED VIEW 2 OF THE SIGNAL PROCESSING SIDE


V367503
V367455
V600371
V358126
CON.B1-B2
CON.B1-C
CON.B1-B2
C660245
V600379

PARTS LIST

Order number	Description
V358126	PCB GUIDE L104 TYPE C
V367455	RIV. P FE D 3.2 L 4.8
V367503	WASHER LA 4.3 D6798
V600371	PLATE PCB
V600379	RGB HOLDER
C660245	BACKPANEL - SIGNAL SIDE

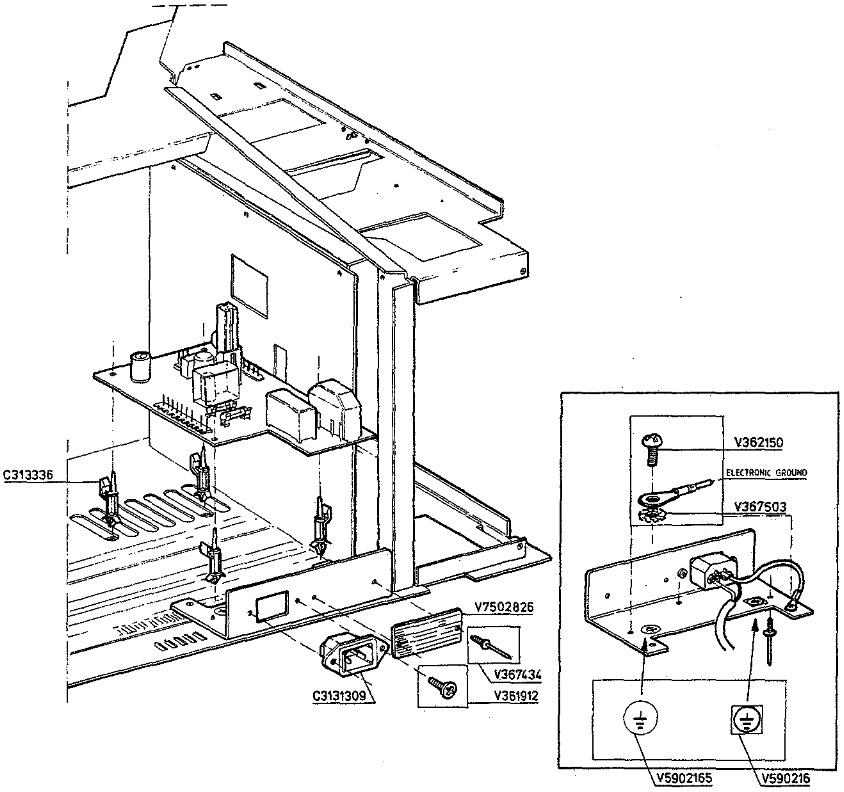
4. EXPLODED VIEW 1 OF THE POWER INPUT / CRT CONNECTION


V362152
V367503
C366156

PARTS LIST

Order number	Description
V362152	SMP+M M4x10 D7985
C366156	NUT M4 H WASHER
V367503	WASHER LA 4.3 D6798

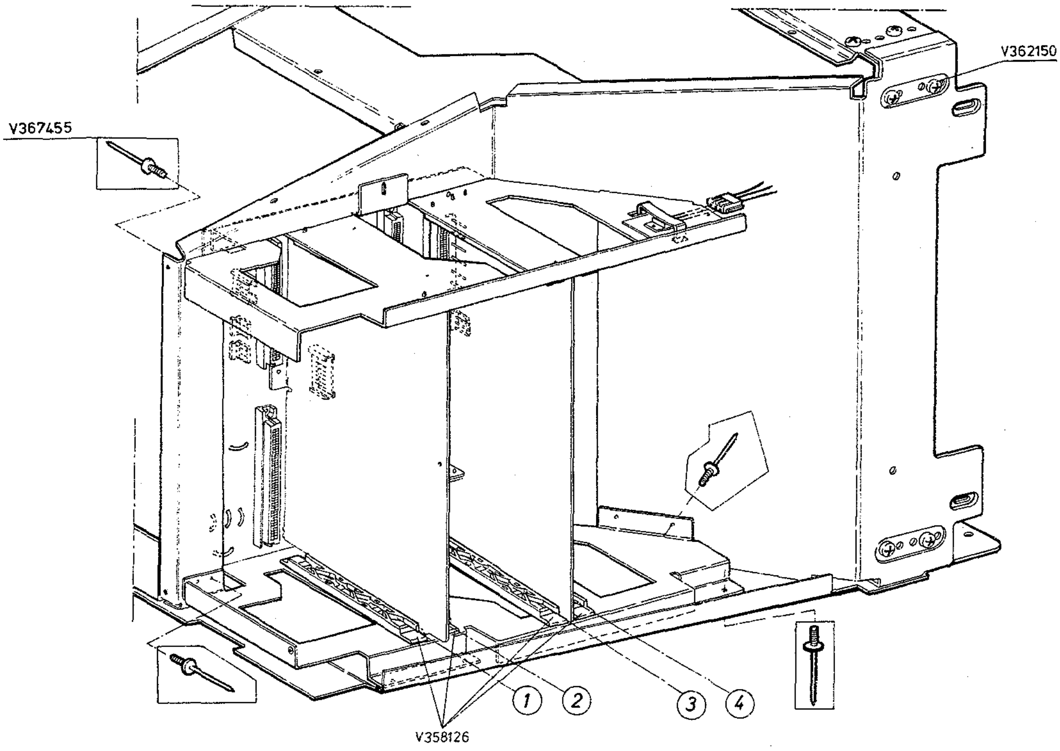
5. EXPLODED VIEW 2 OF THE POWER INPUT


C313336
V7502826
V367434
C3131309
V361912
V362150
ELECTRONIC GROUND
V367503
V5902165
V590216

PARTS LIST

Order number	Description
C3131309	CONMOCTE MAINS UL/CSA 6A
C313336	PCB SPACER E 19.0
V361912	SMC+M M3x6 D965
V362150	SMP+M M4x6 D7985
V367434	RIV.P AL D2.4 L3.2
V367503	WASHER LA 4.3 D6798
V590216	LAB MASSA YELLOW
V5902165	LAB MASSA YEL ELECT.
V7502826	IDENT PLATE CDCT

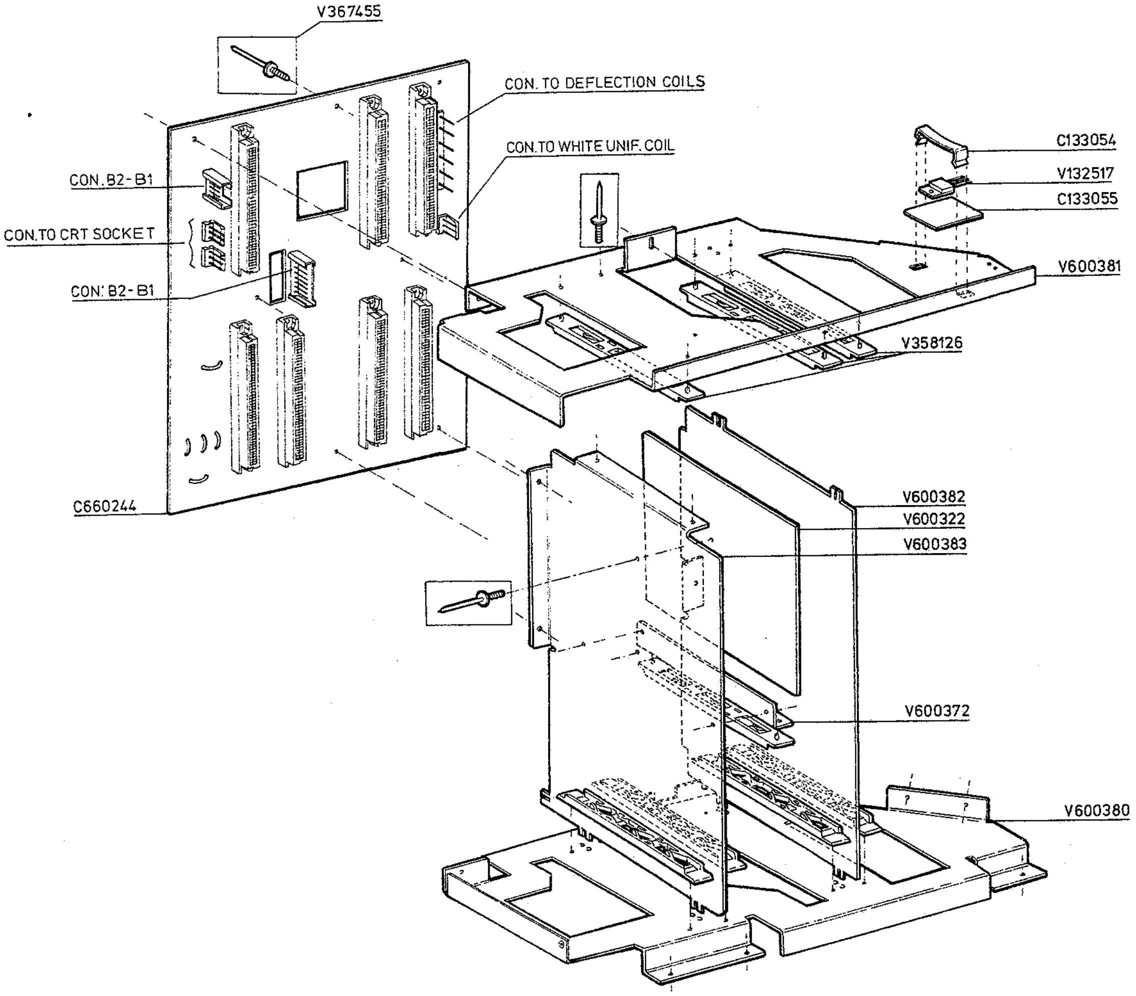
6. EXPLODED VIEW 1 OF THE POWER & DEFLECTION SIDE


V362150
V367455
①
②
③
④
V358126

PARTS LIST

Order number	Description
V358126	PCB GUIDE L104 TYPE C
V362150	SMP+M M4x6 D7985
V367455	RIV. P FE D3.2 L4.8

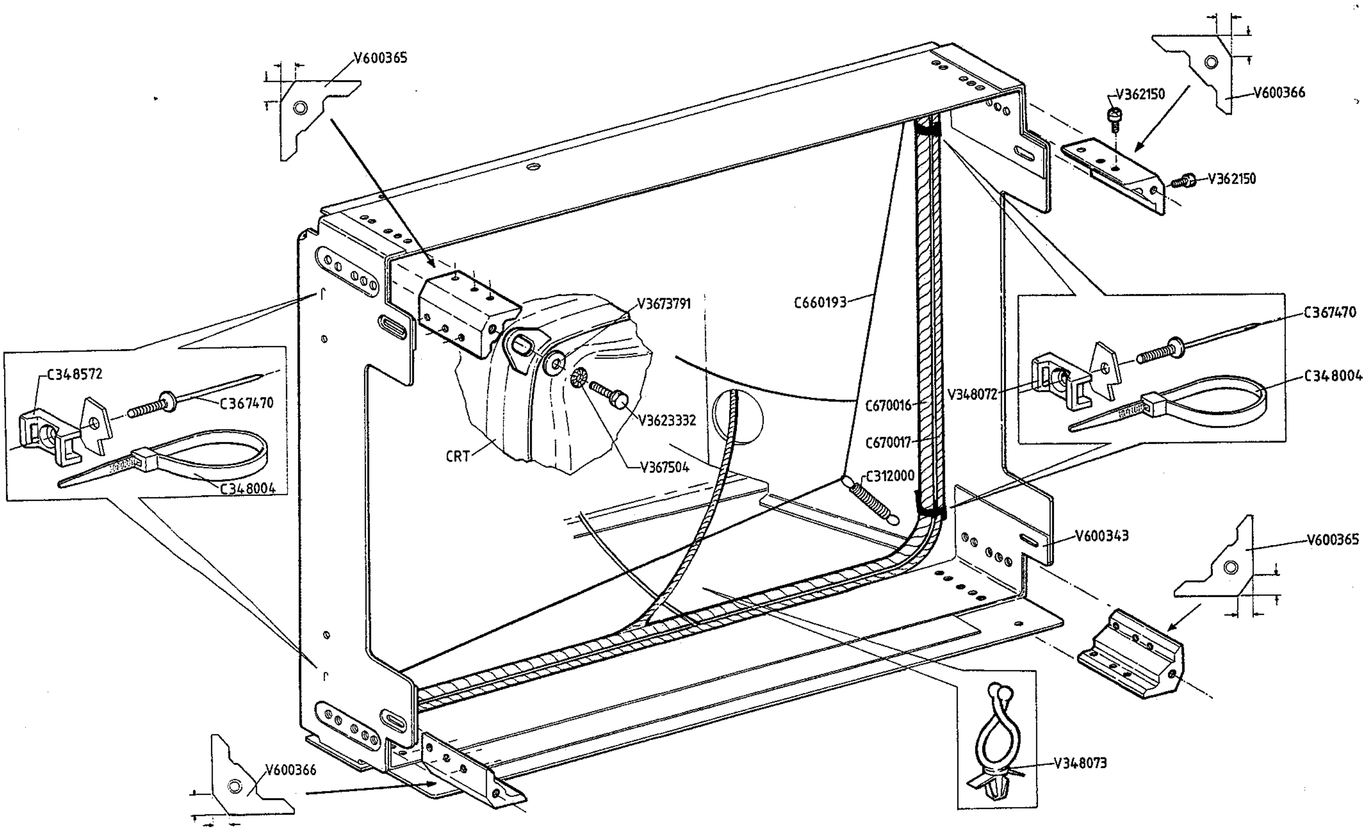
7. EXPLODED VIEW 2 OF THE POWER & DEFLECTION SIDE


V367455
CON. TO DEFLECTION COILS
CON.TO WHITE UNIF. COIL
CON. B2-B1
CON.TO CRT SOCKET
CON: B2-B1
C660244
C133054
V132517
C133055
V600381
V358126
V600382
V600322
V600383
V600372
V600380

PARTS LIST

Order number	Description
V132517	SMC TRA BUX84
C133054	SMC TRA CLIP SOT93
C133055	SMC TRA ISO PL SOT93
V358126	PCB GUIDE L104 TYPE
V367455	RIV. P FE D 3.2 L 4.8
V600322	ISOL PLATE EHT
V600372	VD - BRACKET
V600380	BOTTOM PLATE
V600381	TOP PLATE
V600382	HD-EHT SCREEN
V600383	SMPS SCREEN
C660244	BACKPANEL - POWER & DEFL SIDE

8. EXPLODED VIEW OF THE CRT MOUNTING


V600365
V362150
V600366
V362150
V3673791
C660193
C367470
C348572
C367470
C348004
V3623332
CRT
V367504
C670016
V348072
C348004
C670017
C312000
V600343
V600365
V600366
V348073

PARTS LIST

Order number	Description
C312000	SPRING 7x50/0.60
C348004	WIRTIE L140
V348072	CABLE TIE MOUNT TM2
V348073	CABLE TIE TWIST
V362150	SMP+M M4x6 D7985
C3623332	SMP+M M5x16 D933
V3673791	WASHER PA 5.3 D9021
V367504	WASHER LA 5.3 D6798
V600343	FRAME 6000
V600365	CRT BLOCK 1 6000
V600366	CRT BLOCK 2 6000
C660193	UNIT AQUADAG
C670016	COIL DEGAUSSING CD351
C670017	COIL WHITE UNIFORMITY CD351

MATRIX OF PICTURE TUBES (ALL CDCT 6151 AND CDCT 6351 VERSIONS)

ITEM	NAME/PHOSPHOR PERSISTANCE/ TUBE FACE/ SIGNAL INPUT/MAINS *	PICTURE TUBE ** NUMBER	DESCRIPTION
C9345400	CDCT 6151 NP AB 220V	C131125	TUBPIC M48JEF01-X15
C9345401	CDCT 6151 NP SFE AB 220V	V131131	TUBPIC 510ACXB22-TC05 (H)
C9345402	CDCT 6151 LP-SB TTLI 220V	C131128	TUBPIC M48JEF01XA15
C9345403	CDCT 6151 LP-SB AB 120V	C131125	TUBPIC M48JEF01-X15
C9345404	CDCT 6151 LP-SB AB 120V	C131128	TUBPIC M48JEF01XA15
C9345405	CDCT 6151 LP-SB AB 220V	C131128	TUBPIC M48JEF01XA15
C9345406	CDCT 6151 NP SFE AB 120V	V131131	TUBPIC 510ACXB22-TC05 (H)
C9345407	CDCT 6151 LP-SB SFE AB 120V	V131130	TUBPIC 510ACXB22-TC05 (LH)
C9345408	CDCT 6151 LP-SB SFE AB 220V	V131130	TUBPIC 510ACXB22-TC05 (LH)
C9345409	CDCT 6151 NP SFE TTL 220V	V131131	TUBPIC 510ACXB22-TC05 (H)
C9345410	CDCT 6151 LP-SB SFETTL 220V	V131130	TUBPIC 510ACXB22-TC05 (LH)
C9345500	CDCT 6351 NP ARC AD 120V	V131135	TUBPIC M48 JGQ 39X07
C9345501	CDCT 6351 NP ARC AB 220V	V131135	TUBPIC M48 JGQ 39X07
C9345502	CDCT 6351 NP AB 220V	V131111	TUBPIC M48 JDJ 01X07
C9345503	CDCT 6351 NP AB 120V	V131111	TUBPIC M48 JDJ 01X07
C9345504	CDCT 6351 LP-SB AB 120V	V131118	TUBPIC M48 JDJ 01X/A07
C9345505	CDCT 6351 NP ARC AB 120V	V131135	TUBPIC M48 JGQ 39X07
C9345506	CDCT 6351 NP ARC AD 220V	V131135	TUBPIC M48 JGQ 39X07
C9345507	CDCT 6351 LP-SB ARC AB 120V	V131136	TUBPIC M48 JGQ 39XA07
C9345508	CDCT 6351 LP-SB AB 220V	V131118	TUBPIC M48 JDJ 01X/A07
C9345509	CDCT 6351 NP TTL 220V	V131111	TUBPIC M48 JDJ 01X07
C9345510	CDCT 6351 LP-SB ARC AB 220V	V131136	TUBPIC M48 JGQ 39XA07
C9345511	CDCT 6351 NP ARC TTL 220V	V131135	TUBPIC M48 JGQ 39X07
C9345512	CDCT 6351 LP-SB ARC AD 220V	V131136	TUBPIC M48 JGQ 39XA07
C9345513	CDCT 6351 NP TTLI 220V	V131111	TUBPIC M48 JDJ 01X07

* : ABBREVIATIONS USED IN THIS COLUMN

AB : ANALOG SIGNAL INPUT WITH LOOPED THROUGH BNC CONNECTORS
AD : ANALOG SIGNAL INPUT WITH BNC AND 9 PINS D-TYPE CONNECTORS
ARC : ANTI-REFLECTIVE COATING
LP-SB : LONG PERSISTANCE - SHORT BLUE PHOSPHOR
NP : NORMAL PERSISTANCE PHOSPHOR
SFE : SUPER FINE ETCHED SCREEN
TTL : TTL SIGNAL INPUT WITH 9-PINS D-TYPE CONNECTOR
TTLI : TTL INTENSIFIED SIGNAL INPUT WITH 9-PINS D-TYPE CONNECTOR

** : THE DISPLAY CAN BE EQUIPPED WITH ANOTHER TUBE THAN THE ONE LISTED. PLEASE CHECK THE NUMBER OF THE PICTURE TUBE OF YOUR DISPLAY BEFORE ORDERING A SPARE TUBE.

MATRIX OF NON COMMON PARTS (ALL CDCT 6151 AND CDCT 6351 VERSIONS)
SEE ALSO MATRIX OF PICTURE TUBES

ITEM	NAME/PHOSPHOR PERSISTANCE TUBE FACE/ SIGNAL INPUT/MAINS *	SIGNAL INPUT	MAINS DEPENDENT PARTS		
			CORD	MAINS INPUT	SMPS
C9345400	CDCT 6151 NP AB 220V	C660172	V3261031	C6602431	C660153
C9345401	CDCT 6151 NP SFE AB 220V	C660172	V3261031	C6602431	C660153
C9345402	CDCT 6151 LP-SB TTLI 220V	C6601721	V3261031	C6602431	C660153
C9345403	CDCT 6151 NP AB 120V	C660172	V326111	C660243	C660165
C9345504	CDCT 6151 LP-SB AB 120V	C660172	V326111	C660243	C660165
C9345405	CDCT 6151 LP-SB AB 220V	C660172	V3261031	C6602431	C660153
C9345406	CDCT 6151 NP SFE AB 120V	C660172	V326111	C660243	C660165
C9345407	CDCT 6151 LP-SB SFE AB 120V	C660172	V326111	C660243	C660165
C9345408	CDCT 6151 LP-SB SFE AB 220V	C660172	V3261031	C6602431	C660153
C9345409	CDCT 6151 NP SFE TTL 220V	C6601721	V3261031	C6602431	C660153
C9345500	CDCT 6351 NP ARC AD 120V	C6601722	V326111	C660243	C660257
C9345501	CDCT 6351 NP ARC AB 220V	C660172	V3261031	C6602431	C660256
C9345502	CDCT 6351 NP AB 220V	C660172	V3261031	C6602431	C660256
C9345503	CDCT 6351 NP AB 120V	C660172	V326111	C660243	C660257
C9345504	CDCT 6351 LP-SB AB 120V	C660172	V326111	C660243	C660257
C9345505	CDCT 6351 NP ARC AB 120V	C660172	V326111	C660243	C660257
C9345506	CDCT 6351 NP ARC AD 220V	C6601722	V3261031	C6602431	C660256
C9345507	CDCT 6351 LP-SB ARC AB 120V	C660172	V326111	C660243	C660257
C9345508	CDCT 6351 LP-SB AB 220V	C660172	V3261031	C6602431	C660256
C9345509	CDCT 6351 NP TTL 220V	C6601721	V3261031	C6602431	C660256
C9345510	CDCT 6351 LP-SB ARC AB 220V	C660172	V3261031	C6602431	C660256
C9345511	CDCT 6351 NP ARC TTL 220V	C6601721	V3261031	C6602431	C660256
C9345512	CDCT 6351 LP-SB ARC AD 220V	C6601722	V3261031	C6602431	C660256

WITH :

Order nr.	Description
V3261031	CORD MAINS 3x0.75 2M
V326111	MAINS CORD UL/CSA
C660153	SWITCHED MODE POWER SUPPLY (USED IF 220Vac)
C660165	SWITCHED MODE POWER SUPPLY (USED IF 120Vac)
C660172	RGB ANALOG BNC INPUT
C6601721	TTL INPUT
C6601722	RGB ANALOG BNC/D INPUT
C660243	MAINS INPUT 120Vac
C6602431	MAINS INPUT 220Vac
C660256	SWITCHED MODE POWER SUPPLY (USED IF 220Vac)
C660257	SWITCHED MODE POWER SUPPLY (USED IF 120Vac)

* : FOR ABBREVIATIONS USED IN THIS LIST, SEE MATRIX OF PICTURE TUBES.

RECOMMENDED KIT OF MODULES FOR CDCT6151 AND/OR CDCT6351

Module		Order number	Description	Used in
1		C660149	EHT SUPPLY	CDCT6151
	or	C660240	EHT SUPPLY	CDCT6351
2		C660259	HORIZONTAL DEFLECTION	CDCT6151
	or	C660239	HORIZONTAL DEFLECTION	CDCT6351
3		C660164	RGB OUT AMPLIFIER	CDCT6151, CDCT6351
4		C660153	SWITCHED MODE POWER SUPPLY	CDCT6151 IF 220Vac
	or	C660165	SWITCHED MODE POWER SUPPLY	CDCT6151 IF 120Vac
	or	C660256	SWITCHED MODE POWER SUPPLY	CDCT6351 IF 220Vac
	or	C660257	SWITCHED MODE POWER SUPPLY	CDCT6351 IF 120Vac
5		C660148	VERTICAL DEFLECTION	CDCT6151 (1st series)
	or	C660258	VERTICAL DEFLECTION	CDCT6151, CDCT6351
6		C660231	SYNC PROCESSOR	CDCT6151, CDCT6351
7		C660172	RGB ANALOG BNC INPUT	CDCT6151, CDCT6351
	or	C6601721	TTL INPUT	CDCT6151, CDCT6351
	or	C6601722	RGB ANALOG BNC/D INPUT	CDCT6151, CDCT6351
9		C660170	CONTRAST & BRIGHTNESS	CDCT6151, CDCT6351
10		C660243	MAINS INPUT 120Vac	CDCT6151, CDCT6351
	or	C6602431	MAINS INPUT 220Vac	CDCT6151, CDCT6351
11		C660154	CRT SOCKET	CDCT6151, CDCT6351
13		C660242	LED INDICATOR	CDCT6151, CDCT6351

A separate list including prices is available for every display version.

RECOMMENDED KIT OF SEMICONDUCTORS FOR CDCT 6151 AND/OR CDCT 6351

Order number	Description		Quantity	
C131407	BC 547	TRANS.	1	
C131446	BSX 29	TRANS.	1	
C131472	BU 126	TRANS.	1	
C131491	2N2369	TRANS.	1	
C131644	1N 4001	RECT.	1	
C131646	1N 4007	RECT.	1	
C131663	LED D5 YELLOW		1	
C131664	LED D5 RED		1	
C131720	ZENER 0.5 C 6V2		1	
C131733	ZENER 0.4 C 2V1		1	
C131766	ZENER 0.5 B 18V		1	
C131770	ZENER 0.4 C 2V8		1	
C131902	BY 127	RECT.	1	
C131907	BY 184	RECT.	1	
C131910	BY 207	DIODE	1	
C131911	PY 206	RECT.	1	
C132071	BG 2097-641	TRIPLER	1	
C1321642	TDA 1170 SH	IC	1	
C1322075	TAG E0102 FB	THYRIS.	1	
C132210	SR 2106	THYRIS.	1	
C132509	BU 208A	TRANS.	1	FOR CDCT 6351 ONLY
C132562	BC 639	TRANS.	1	
C132574	BU 508 A	TRANS.	1	
C134002	LM 340 T12	IC	1	
C134016	LM 320 T12	IC	1	
C137296	TL 494	IC	1	
C137395	4098 B	IC	1	
C137713	TDA 4610	IC	1	
V131257	STABIL. NEON 103V		1	
V1314071	BC 547 B	TRANS.	1	
V131411	BC 549 C	TRANS.	3	
V1314131	BC 557 B	TRANS.	1	
V1314182	BC 559 C	TRANS.	2	
V131426	BC 337	TRANS.	1	
V1314651	BF 245 B	FET	1	
V131471	BF 458	TRANS.	1	
V131496	2N3906	TRANS.	1	
V131504	AAZ 15	DIODE	1	
V131621	BAX 13	DIODE	3	
V131622	BAX 16	DIODE	1	
V131627	BAV 21	DIODE	1	
V131650	LED MV 5024 RED 5MM		1	
V131662	LED MINI RED 3MM		1	
V131743	ZENER 0.5 W C 8V2		1	
V131751	ZENER 0.5 W C 9V1		1	

Order number	Description	Quantity		
V1317562	ZENER 0.5 W 2 7V5		1	
V131757	ZENER 0.5 W C 3V9		1	
V131777	ZENER 0.5 W C 36V		1	
V131917	BY 228	RECT.	1	
V131921	BY 299	RECT.	1	
V131940	BY 292-300	RECT.	1	FOR CDCT 6151 ONLY
V1321025	SMCDIDVOLSTAB ZTK33B		1	
V132134	CA 3046	IC	1	
V132501	BC 327-25	TRANS.	1	
V132508	BU 209	TRANS.	1	FOR CDCT 6151 ONLY
V132516	BF 422	TRANS.	1	
V132517	BUX 84	TRANS.	1	
V132538	2N2219A	TRANS.	1	
V132551	BUY 47	TRANS.	1	FOF CDCT 6151 ONLY
V132552	BF 423	TRANS.	1	
V132557	BSW 68 A	TRANS.	1	
V132575	BC 517	TRANS.	1	
V132577	BD 649	TRANS.	1	
V134005	LM 339	IC	1	
V134114	MC 1458	IC	1	
V137302	4011 B	IC	1	
V137394	4093 B	IC	1	
V137719	TDA 2595	IC	1	

SECTION VII : SCHEMATICS

INTRODUCTION

1. HOW TO USE SYMBOLS

□ On the schematic diagrams in this manual, each board is identified by means of a figure, mostly printed in a square box in the right hand lower corner.
In the list below, you will find the meaning of the figures used to identify the boards of which the schematic diagrams are printed in the same order on the next pages.

1	EHT SUPPLY for CDCT 6151 EHT SUPPLY for CDCT 6351	C660149 C660240
2	HORIZONTAL DEFLECTION for CDCT 6151 HORIZONTAL DEFLECTION for CDCT 6351	C660259 C660239
3	RGB OUT AMPLIFIER	C660164
4	SWITCHED MODE POWER SUPPLY CDCT 6151 SWITCHED MODE POWER SUPPLY CDCT 6351	C660153/C660165 C660256/C660257
5	VERTICAL DEFLECTION (1st CDCT 6151) VERTICAL DEFLECTION	C660148 C660258
6	SYNC PROCESSOR	C660231
7	RGB ANALOG BNC INPUT TTL INPUT RGB ANALOG D INPUT	C660172 C6601721 C6601722
8	No unit 8 in this display	
9	CONTRAST & BRIGHTNESS	C660170
10	MAINS INPUT 120 Vac MAINS INPUT 220 Vac	C660243 C6602431
11	CRT SOCKET	C660154
12	CONTROL PANEL	C660241
13	LED INDICATOR	C660242

○ ⬭ Most board connectors used in this display have 32 contacts. For one board input or output, in general two interconnected opposite contacts of such a 32-pins connector are used.
The odd contact number is used for indication.
If a board has two 32-pins connectors, one is called A, the other one B.

Examples of contact indication:

⑧ : contact 8

(A8) : contact 8 of connector A

Example of an interconnection between two boards (fig. 1):

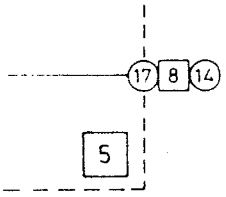


fig. 1

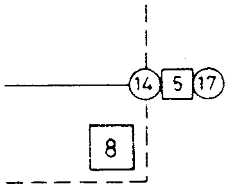
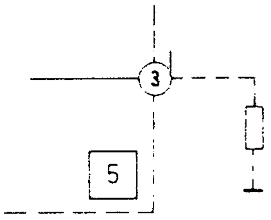


fig. 2

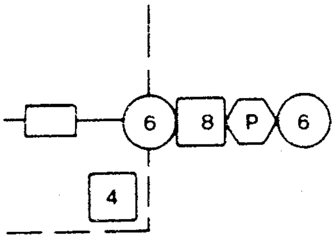
Contact 17 of board $\boxed{5}$ runs to unit (or board) $\boxed{8}$ where it finds contact 14.
On board $\boxed{8}$ one finds the corresponding indication (see fig.2).

Some drawings have components drawn in dotted line beyond the outline of the board. Those parts are not mounted on a definitely numbered unit but on the plug or via the plug at the frame, the cabinet, etc.



Some boards do not have a connector but a wiring plug.
Those wiring plugs are indicated as ⬡.

So one can find following combination:



which means that contact 6 of board $\boxed{4}$ runs to board $\boxed{8}$ where it finds contact 6 of plug ⟨P⟩ .

2. HOW TO USE PARTS LISTS

2.1. GENERAL

Each parts list starts with the reference to the unit and the unit name. The next line gives the company order number of the complete unit. The next line gives the column headings: ORDER NUMBER, DESCRIPTION and ITEM.

The ORDERNUMBER is the company order number. Safety components are marked with ⚠ , critical components concerning radiation with a * sign. The DESCRIPTION is a coded description of the component. See paragraph CODE DESCRIPTION for more info. The ITEM column gives the component location of the component or a description of the mechanical parts and/or the quantity (QTY:).

2.2. CODE DESCRIPTION

The component description for resistors and capacitors consists of 4 groups of characters with a total quantity of maximum 19 characters.

$$\underbrace{XXXXXXX}_{A}\underbrace{XXXXXX}_{B}\underbrace{X}_{C}\underbrace{XXXXX}_{D}$$

GROUP A: This group of maximum 7 characters gives the component code described in paragraph 2.3. CODE TO COMPONENTS.
e.g. CPOMEPO: potted metal polyester capacitor.

GROUP B: This group of maximum 6 characters gives the component value.
e.g. 3K3: 3.3 kilo Ohms for resistors.
3.3 nanofarads for capacitors.

GROUP C: The tolerance code, given with one character and listed in paragraph 2.4. TOLERANCE CODES.
e.g. K: 10%

GROUP D: This group of maximum five characters gives the maximum permissible power dissipation for resistors and the limiting voltage for capacitors.
e.g. 0,25 for resistors means 0.25W,
63 for a capacitor means 63V.

2.3. CODES TO COMPONENTS

CCEDI	CAPACITOR VERTICAL MOUNTED
CCEMI	CAPACITOR CERAMIC MINIATURE
CELAX	CAPACITOR ELECTROLYTIC AXIAL
CELBI	CAPACITOR ELECTROLYTIC BIPOLAR
CELPR	CAPACITOR ELECTROLYTIC PRINTED CIRCUIT
CELSN	CAPACITOR ELECTROLYTIC SNAP IN
CFDTRH	CAPACITOR FILM DIELECTRIC TRIMMER HORIZONTAL MOUNTING
CFDTRV	CAPACITOR FILM DIELECTRIC TRIMMER VERTICAL MOUNTING
CMAINS	CAPACITOR Y MAINS
CNPOMI	CAPACITOR CERAMIC CLASS 1 TEMP COEFF NPO MINIATURE
CN750	CAPACITOR TEMP COEFF N750
COIL LIN	COIL LINEARITY
CON DIL	CONNECTOR DUAL IN LINE
CONFOBSE	CONNECTOR FEMALE ON BOARD SIDE ENTRANCE
CONFOC	CONNECTOR FEMALE ON CHASSIS
CONHOUSE	CONNECTOR HOUSE
CONMOBTE	CONNECTOR MALE ON BOARD TOP ENTRANCE
CONMOW	CONNECTOR MALE ON WIRE
CONSNAP	CONNECTION SNAP WIRING
CPCPO	CAPACITOR POLYCARBONATE POTTED
CPOMEFF	CAPACITOR POLYESTER METAL FILM FOIL
CPOMEPO	CAPACITOR POLYESTER METAL POTTED
CPOPO	CAPACITOR POLYESTER POTTED
CPOSAPO	CAPACITOR POLYESTER SAVE POTTED
CPPPR	CAPACITOR POLYPROPYLENE PRINTED CIRCUIT

RMCE	RESISTOR GROUP MULTITURN POTENTIOMETER CERAMIC
RRCF	RESISTOR GROUP CARBON FILM
RRCFF	RESISTOR GROUP CARBON FILM FUSING
RRHOLDER	RESISTOR GROUP RESISTANCE HOLDER
RRMF	RESISTOR GROUP METAL FILM
RRMO	RESISTOR GROUP RESISTOR METAL OXIDE
RRPTC	RESISTOR GROUP RESISTOR POSITIVE TEMP COEFF
RRWW	RESISTOR GROUP RESISTOR WIRE WOUND
RRWWH	RESISTOR GROUP WIRE WOUND RESISTOR HORIZONTAL
RTCEMV	RESISTOR GROUP TRIM POTENTIOMETER CERAMIC MINIATURE VERT
RMCEM	RESISTOR GROUP MULTITURN POTENTIOMETER CERAMIC MINIATURE
RTCEMH	RESISTOR GROUP TRIM POTENTIOMETER CERAMIC MINIATURE HOR
RTWW	RESISTOR GROUP TRIM POTENTIOMETER WIRE WOUND

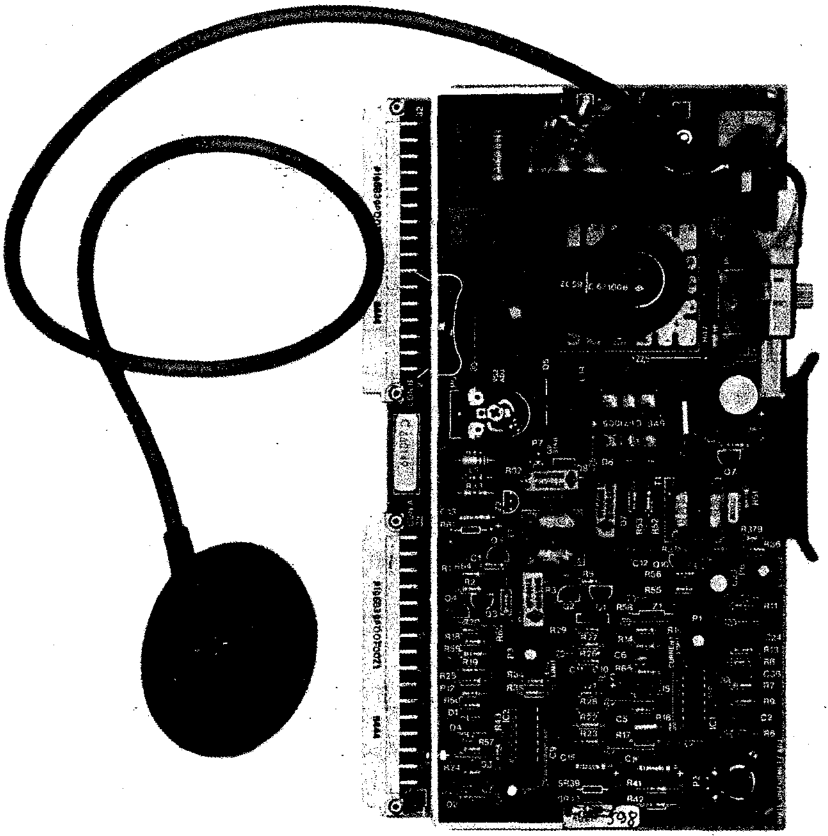
SMCDIO	SEMICONDUCTOR DIODE
SMCDIOLED	SEMICONDUCTOR DIODE LED
SMCDIOREC	SEMICONDUCTOR DIODE RECTIFIER
SMCDIOVAR	SEMICONDUCTOR DIODE VARICAP
SMCDIOZEN	SEMICONDUCTOR DIODE ZENER
SMCIC	SEMICONDUCTOR INTEGRATED CIRCUIT
SMCICL	SEMICONDUCTOR INTEGRATED CIRCUIT LINEAR
SMCICLOPA	SEMICONDUCTOR INTEGRATED CIRCUIT LINEAR OPERATIONAL AMPLI
SMCICCMOS	SEMICONDUCTOR INTEGRATED CIRCUIT C MOS
SMCICLVOL	SEMICONDUCTOR INTEGRATED CIRCUIT LINEAR VOLTAGE

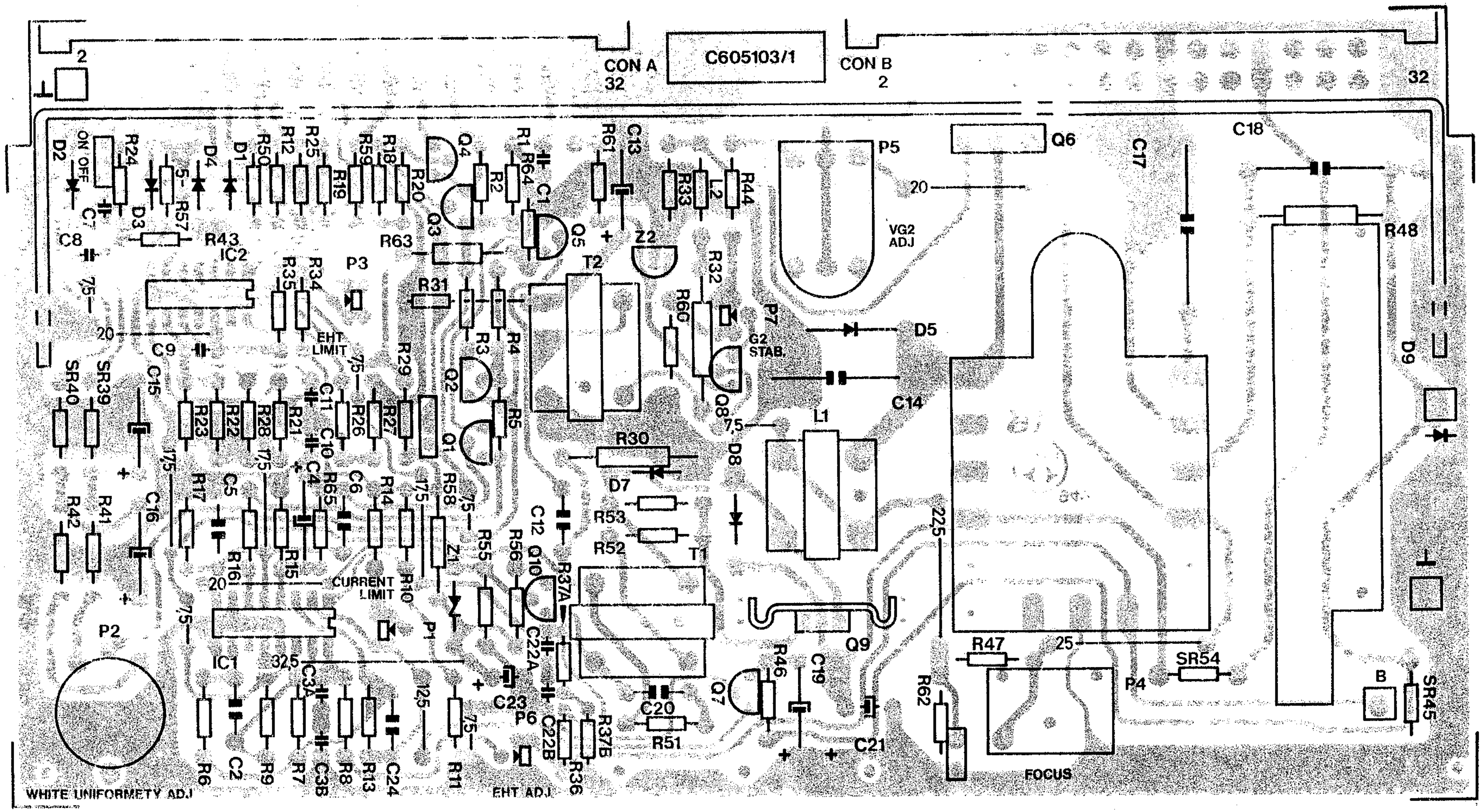
SMCPOWFET	SEMICONDUCTOR POWER FET
SMCTHY	SEMICONDUCTOR THYRISTOR
SMCOPTCOU	SEMICONDUCTOR OPTO COUPLER
SMCTRA	SEMICONDUCTOR TRANSISTOR
SMCTRA CLIP	SEMICONDUCTOR TRANSISTOR CLIP
SMCTRAFIX	SEMICONDUCTOR TRANSISTOR FIXER
SMCTRACOOLER	SEMICONDUCTOR TRANSISTOR HEATSINK
SMCTRAPOW	SEMICONDUCTOR TRANSISTOR POWER
SMCTRA ISO	SEMICONDUCTOR TRANSISTOR INSULATION
TRF CUR	TRANSFORMER CURRENT SENSING
TRF SHIFT	TRANSFORMER SHIFT
TRF DRIV	TRANSFORMER DRIVER
TRF SUP	TRANSFORMER SUPPLY

2.4. TOLERANCE CODES

CHARACTER	CAPACITOR/RESISTOR TOLERANCE	CHARACTER	CAPACITOR/RESISTOR TOLERANCE
A		N	+/-30%
B	+/-0.1%	P	+100%, -0%
C	+/-0.25%	Q	+30% , -10%
D	+/-0.5%	R	+30% , -20%
E		S	+50% , -20%
F	+/-1%	T	+50% , -10%
G	+/-2%	U	+80% , -0%
H	+/-2.5%	V	+100%, -10%
J	+/-5%	W	+20% , -0%
K	+/-10%	X	
L	+/-15%	Y	+50% , -0%
M	+/-20%	Z	+100%, +100% -20% , -10%

1 EHT SUPPLY C660149




C605103/1
CON A
32
CON B
2
2
32
D2
ON OFF
R24
C7
D3
R57
5
D4
D1
R50
R12
R25
R19
R59
R18
R20
Q4
R2
R1
R64
C1
Q3
Q5
R63
C8
R43
IC2
R35
R34
P3
EHT LIMIT
R31
R3
R4
T2
R61
C13
Z2
R33
L2
R44
R32
R60
P7
G2 STAB.
Q8
P5
20
VG2 ADJ
Q6
C17
C18
R48
D5
C14
D9
7,5
20
C9
SR40
SR39
C15
R23
R22
R28
R21
C11
C10
C4
R26
R27
R29
Q2
Q1
R5
R30
D7
D8
L1
17,5
R17
C5
R16
R15
R65
C6
R14
R10
R58
Z1
R55
R56
Q10
R37A
C12
R53
R52
T1
22,5
R42
R41
C16
CURRENT LIMIT
P1
IC1
32,5
C3A
C23
C22A
P6
C22B
R37B
R36
C20
R51
Q7
R46
C19
C21
Q9
R47
25
R62
SR54
P4
B
SR45
FOCUS
P2
R6
C2
R9
R7
C3B
R8
R13
C24
12,5
R11
EHT ADJ.
WHITE UNIFORMETY ADJ

CIRCUIT DESCRIPTION EHT BOARD [1]

The positive flyback arrives at contact A30 and triggers the bistable multi Q1 Q2. Q1 is now on and the low voltage of pin 6 of IC1 allows the oscillator to work.
The output sawtooth at pin 5 turns the bistable multi Q1, Q2 off again so that a new flyback pulse is needed to start it.
The sawtooth is applied to pin 8 of IC2.
The output at pin 14 is integrated by C10 and via C11 applied to pin 10. On pin 13, a drive pulse is available of which the duty cycle is not depending on the horizontal frequency. It is amplified by Q5 and via D2 it triggers Q6.

The EHT generator consists of the 140 Volt power supply, Q9 acting as a switch. L1, Q6, D5, C14, the primary of T3 and C17. The flyback pulses that are generated across C14 are amplified by transformer T3. The resulting 8kV pulses are multiplied by the voltage multiplier D9. A sample of the high voltage is available from an internal 300 MOhm transistor.

The oscillator of IC1 also drives a pulse-width modulator of which the output pulse at pin 8 determines the conduction time of Q9 via T1. The pulse width is determined by the EHT feedback via P6 and by the beam current limiter information of Q7.

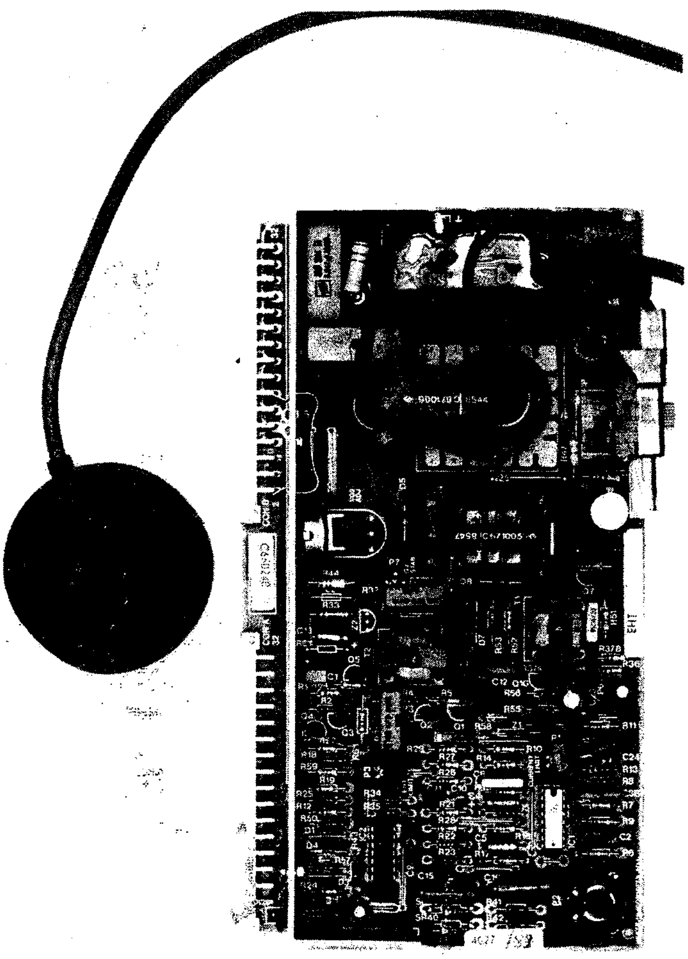
R36, R37 deliver a voltage to pin 5 of IC2 which is compared to a reference adjustable by P3. If the voltage is higher than the reference, pin 2 is high and acts as the fail safe information on contact A20.

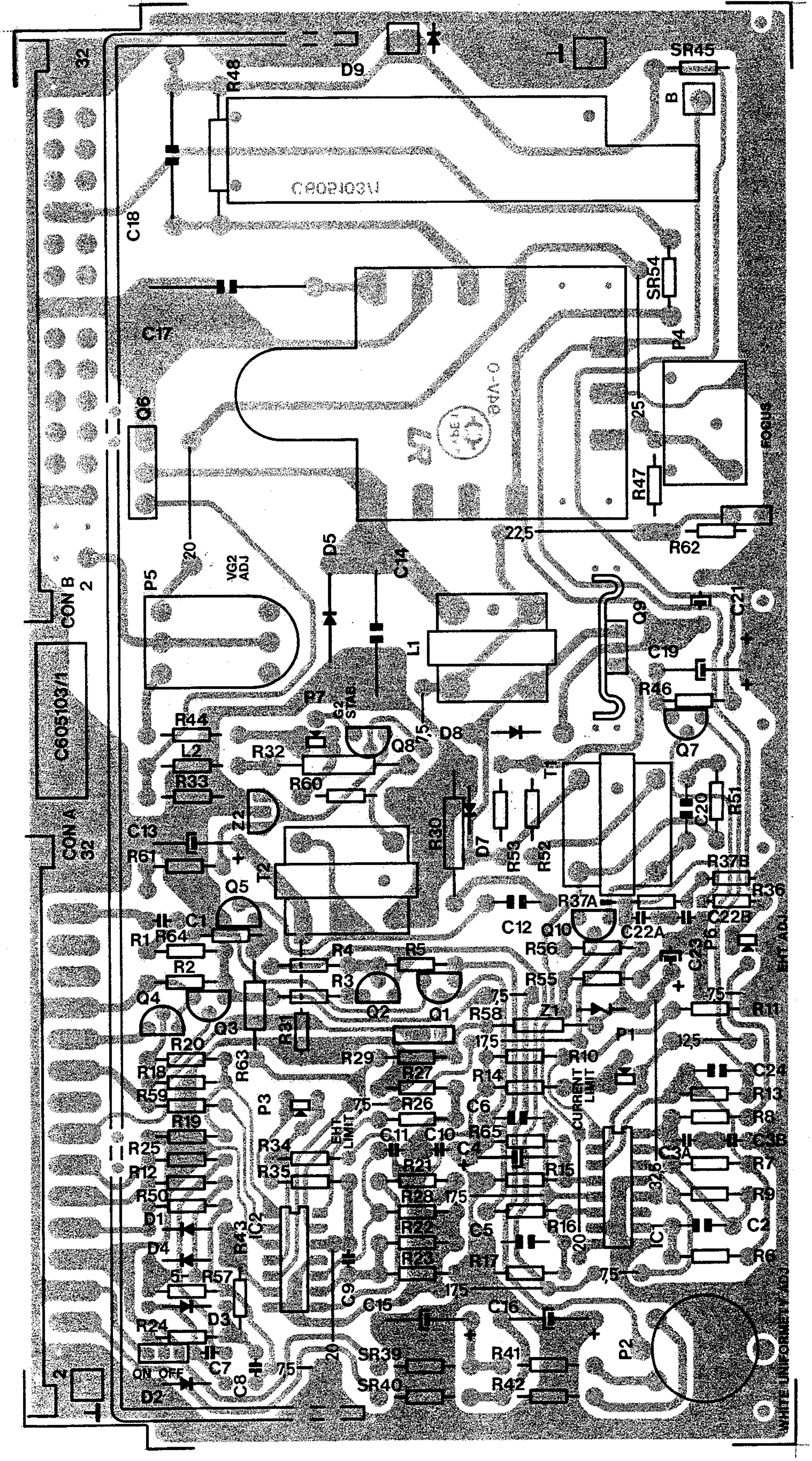
The horizontal flyback pulses of contact A30 can be shorted by Q3 in case pin 1 of IC2 is high.
For normal operation pin 1 is low, that is if on contact A14 horizontal sync, on contact A10 high from horizontal scan failure and on contact A12 high from vertical scan failure are available. If one of the three inputs fails, pin 1 of IC2 is high and via Q4 also the scan failure warning light in the front panel is on.

P1 allows adjustment of white uniformity by sending an adjustable DC current through the white uniformity coil.

The focus voltage is derived from the first rectifier of the tripler and goes to G3.
P5 allows adjustment of the Vg2.

1 EHT SUPPLY C660240





CON B
2
32
CON A
32
2
C605103/1
C605103U
D9
R48
C18
C17
Q6
P5
VG2 ADJ
20
D5
C14
L1
Q9
C21
C19
R46
Q7
SR45
B
SR54
P4
25
FOCUS
R47
22,5
R62
R44
L2
R33
R7
G2 STAB.
R32
Q8
7,5
D8
R60
Z2
C13
R61
T2
R30
D7
R53
R52
T1
C20
R51
R37B
R36
C22B
R37A
C12
Q10
C22A
P6
EHT ADJ
C23
R56
R55
Q5
C1
R1
R64
R2
R4
R5
R3
Q2
Q1
Q4
Q3
R31
R63
R58
Z1
R11
P1
R20
R18
R59
R29
R27
R26
R14
R10
CURRENT LIMIT
12,5
C24
R13
R8
P3
EHT LIMIT
C6
R19
R25
R12
R34
R35
C11
C10
R65
C4
R21
R15
C3A
C3B
R7
R9
R50
D1
IC2
R28
17,5
R16
IC1
32,5
C2
D4
R43
R22
C5
R23
R17
R6
R57
D3
C9
C15
C16
R24
C7
C8
SR39
R41
P2
WHITE UNIFORMITY ADJ
ON OFF
D2
SR40
R42

CIRCUIT DESCRIPTION EHT BOARD 1

The positive flyback arrives at contact A30 and triggers the bistable multi Q1 Q2. Q1 is now on and the low voltage of pin 6 of IC1 allows the oscillator to work.
The output sawtooth at pin 5 turns the bistable multi Q1, Q2 off again so that a new flyback pulse is needed to start it.
The sawtooth is applied to pin 8 of IC2.
The output at pin 14 is integrated by C10 and via C11 applied to pin 10. On pin 13, a drive pulse is available of which the duty cycle is not depending on the horizontal frequency. It is amplified by Q5 and via D2 it triggers Q6.

The EHT generator consists of the 140 Volt power supply, Q9 acting as a switch. L1, Q6, D5, C14, the primary of T3 and C17. The flyback pulses that are generated across C14 are amplified by transformer T3. The resulting 8kV pulses are multiplied by the voltage multiplier D9. A sample of the high voltage is available from an internal 300 MOhm transistor.

The oscillator of IC1 also drives a pulse-width modulator of which the output pulse at pin 8 determines the conduction time of Q9 via T1. The pulse width is determined by the EHT feedback via P6 and by the beam current limiter information of Q7.

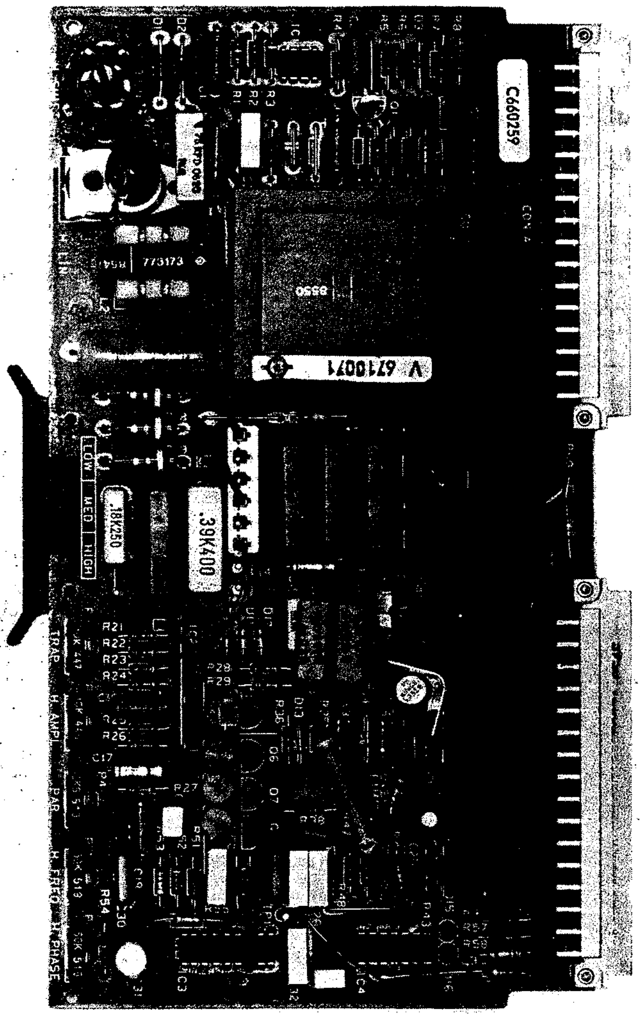
R36, R37 deliver a voltage to pin 5 of IC2 which is compared to a reference adjustable by P3. If the voltage is higher than the reference, pin 2 is high and acts as the fail safe information on contact A20.

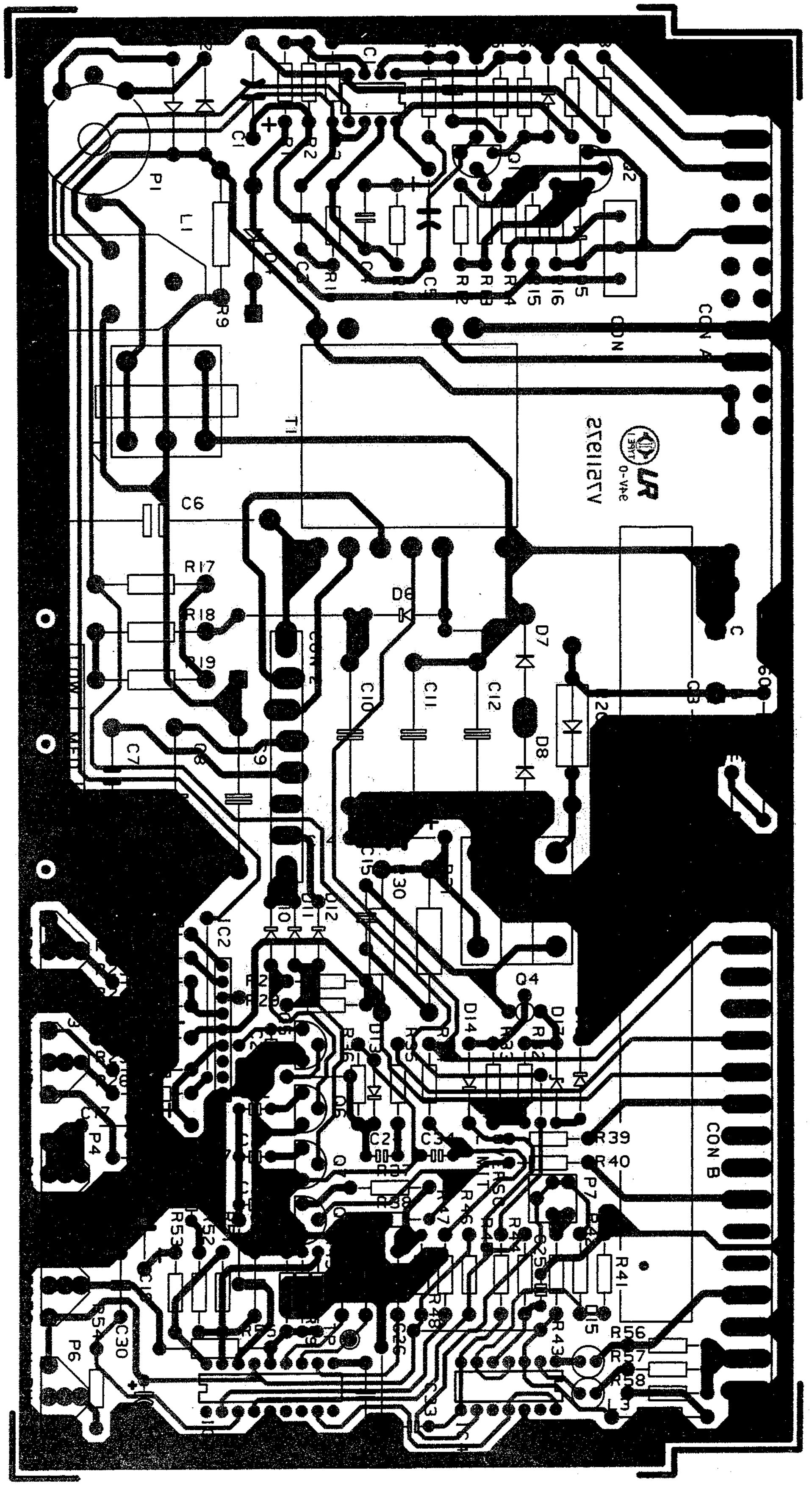
The horizontal flyback pulses of contact A30 can be shorted by Q3 in case pin 1 of IC2 is high.
For normal operation pin 1 is low, that is if on contact A14 horizontal sync, on contact A10 high from horizontal scan failure and on contact A12 high from vertical scan failure are available. If one of the three inputs fails, pin 1 of IC2 is high and via Q4 also the scan failure warning light in the front panel is on.

P1 allows adjustment of white uniformity by sending an adjustable DC current through the white uniformity coil.

The focus voltage is derived from the first rectifier of the tripler and goes to G3.
P5 allows adjustment of the Vg2.

2 HORIZONTAL DEFLECTION C660259


C660259
V 6710071
39K400
18K250
LOW
MED
HIGH
TRAP
H.AMPL
PAR
H.FREQ
H.PHASE


P1
L1
C1
R1
R2
R9
T1
C6
R17
R18
R19
D6
D7
D8
C7
C8
C9
C10
C11
C12
C15
D10
D11
D12
IC2
Q4
D14
C21
C34
R37
R38
R39
R40
R41
P7
R43
R56
R57
R58
P4
P6
C30
R53
R54
CON A
CON B
CON
C26
C8
V751197
Q1
Q2
R12
R13
R14
R15
R16
C5

V751197

CIRCUIT DESCRIPTION HORIZONTAL DEFLECTION BOARD 2

The sync signal arrives at contact B20 and goes to pin 11 of IC3 via Q8. At pin 2 of IC3 positive horizontal flyback pulses arrive. IC3 contains an oscillator, a phase-comparator and a drive circuit. P5 enables the adjustment of the horizontal free running frequency. The frequency is also determined by C20. For medium and high scan rates C22 and/or C21 are added. P6 enables adjustment of the horizontal phase. By shorting pin 12 (Tp.1) to ground, the free running frequency can be adjusted.

The output pulse at pin 4 of IC3 is used for triggering the horizontal deflection via Q4 and T2. The horizontal deflection circuit consists of the 140V power supply modulated by the external transistor BUX 84, the primary of transformer T1, Q3, D7, D8, C11, C12 (flyback capacitors), the horizontal deflection coil, L1 for horizontal linearity and C7 for S-correction.

On medium and high scanning range C9 and C8 are/or added to C7.

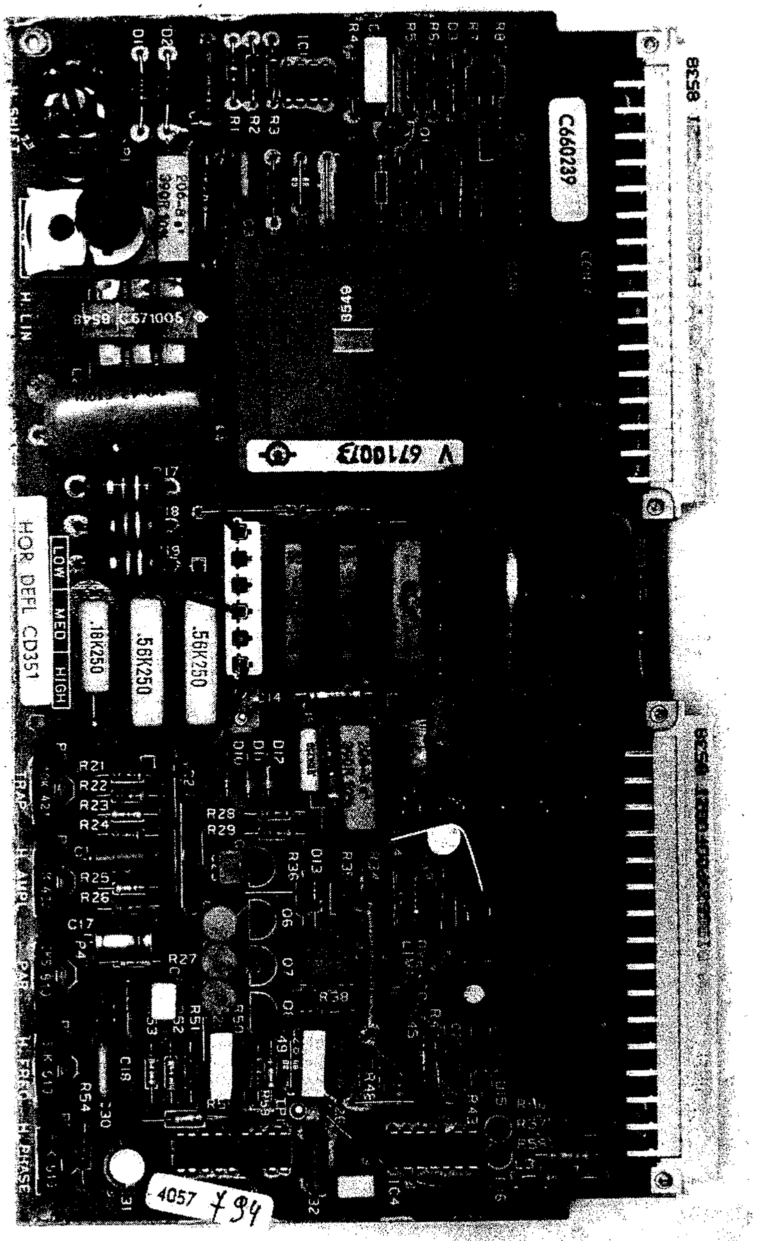
The power supply on the emitter of the BUX 84 is fed to pin 1, pin 2 or pin 3 of transformer T1 depending on the position of the horizontal scan range jumper.

The vertical flyback at contact B10 triggers the sawtooth generator Q5, C23, IC2. The output on pin 4 of IC2 consists of a DC component, a vertical parabola and a vertical sawtooth. The vertical sawtooth part is adjustable by P2, the parabola amplitude adjustable by P4 and the horizontal amplitude including the corrections is set by P3.

Via R26 this reference voltage arrives at pin 5 of IC1. Pin 6 of IC1 receives rectified (D6,C10) flyback pulses divided by R18 R19 R17 R13. The output at pin 7 is amplified by the second operational amplifier of IC1 of which the output at pin 1 is amplified by Q1 and Q2 in order to modulate the BUX 84 which is externally mounted. This keeps the horizontal amplitude independent of the selected horizontal frequency.

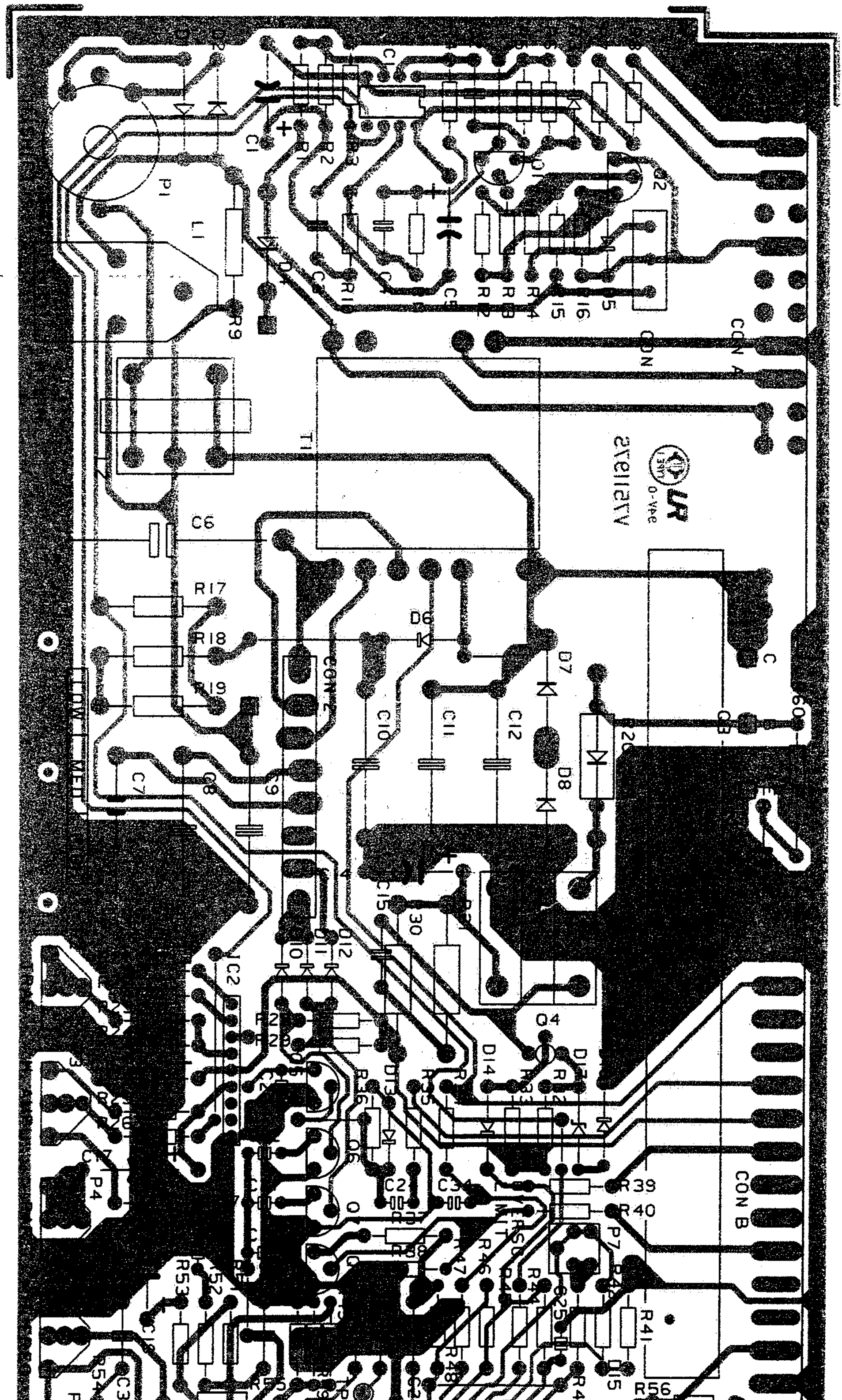
Scan failure and horizontal drive are detected. If the voltage across R3 drops below a value dependent on the adjustment of P7 (OVERSCAN LIMIT), the output of IC4d switches off the horizontal drive via pin 8 if IC3 and the scan failure detection LED D15 illuminates. If the horizontal drive pulses on pin 4 of IC3 are absent, D16 is driven via IC4b pin2.

$\boxed{2}$ HORIZONTAL DEFLECTION C660239



C660239
8538
V 671007
C671005
HOR DEFL CD351
LOW
MED
HIGH
.18K250
.56K250
.56K250
H SHIFT
H LIN
TRAP
H AMPL
PAR
H FREQ
H PHASE
4057

V751197


P1
L1
C1
R2
R9
D4
C5
R12
R13
R14
D15
D16
Q1
Q2
CON A
CON
T1
C6
R17
R18
R19
D6
D7
D8
CON 2
C10
C11
C12
C7
C8
IC2
D10
D11
D12
Q4
D14
R39
R40
P7
R41
R43
R56
R57
R58
CON B
C2
C34
R38
R47
R46
R48
C26
C33
R53
P4
P6
C30

CIRCUIT DESCRIPTION HORIZONTAL DEFLECTION BOARD 2

The sync signal arrives at contact B20 and goes to pin 11 of IC3 via Q8.
At pin 2 of IC3 positive horizontal flyback pulses arrive.
IC3 contains an oscillator, a phase-comparator and a drive circuit.
P5 enables the adjustment of the horizontal free running frequency.
The frequency is also determined by C20. For medium and high scan rates C22 and/or C21 are added.
P6 enables adjustment of the horizontal phase.
By shorting pin 12 (Tp.1) to ground, the free running frequency can be adjusted.

The output pulse at pin 4 of IC3 is used for triggering the horizontal deflection via Q4 and T2.
The horizontal deflection circuit consists of the 140V power supply modulated by the external transistor BUX 84, the primary of transformer T1, Q3, D7, D8, C11, C12 (flyback capacitors), the horizontal deflection coil, L1 for horizontal linearity and C7 for S-correction.

On medium and high scanning range C9 and C8 are/or added to C7.

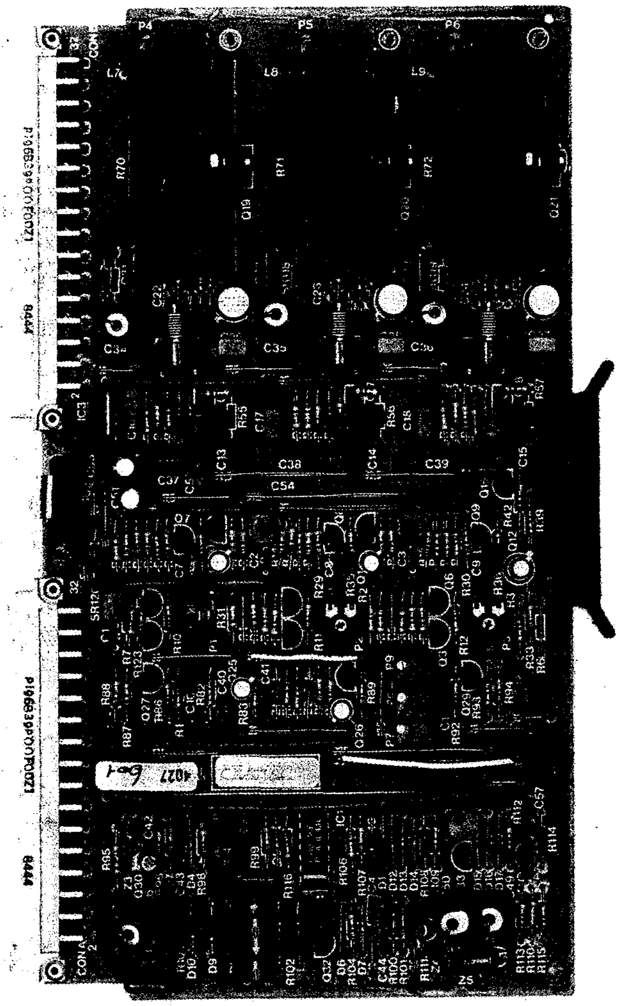
The power supply on the emitter of the BUX 84 is fed to pin 1, pin 2 or pin 3 of transformer T1 depending on the position of the horizontal scan range jumper.

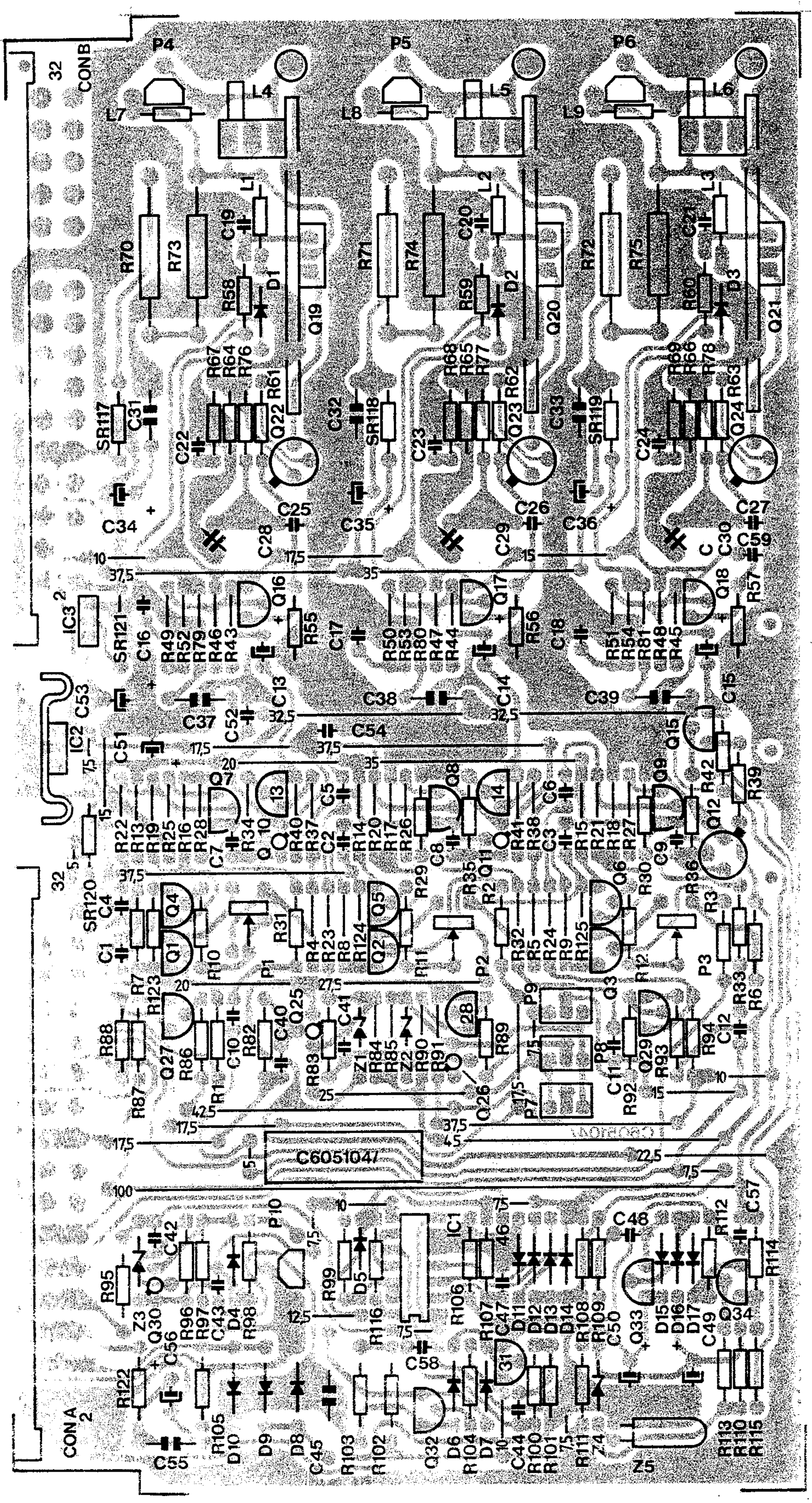
The vertical flyback at contact B10 triggers the sawtooth generator Q5, C23, IC2. The output on pin 4 of IC2 consists of a DC component, a vertical parabola and a vertical sawtooth. The vertical sawtooth part is adjustable by P2, the parabola amplitude adjustable by P4 and the horizontal amplitude including the corrections is set by P3.

Via R26 this reference voltage arrives at pin 5 of IC1. Pin 6 of IC1 receives rectified (D6,C10) flyback pulses divided by R18 R19 R17 R13.
The output at pin 7 is amplified by the second operational amplifier of IC1 of which the output at pin 1 is amplified by Q1 and Q2 in order to modulate the BUX 84 which is externally mounted.
This keeps the horizontal amplitude independent of the selected horizontal frequency.

Scan failure and horizontal drive are detected.
If the voltage across R3 drops below a value dependent on the adjustment of P7 (OVERSCAN LIMIT), the output of IC4d switches off the horizontal drive via pin 8 if IC3 and the scan failure detection LED D15 illuminates.
If the horizontal drive pulses on pin 4 of IC3 are absent, D16 is driven via IC4b pin2.

3 RGB OUT AMPLIFIER C660164




CON B
32
P4
P5
P6
L1
L2
L3
L4
L5
L6
L7
L8
L9
R70
R71
R72
R73
R74
R75
C19
C20
C21
R58
R59
R60
D1
D2
D3
Q19
Q20
Q21
R67
R64
R76
R61
R68
R65
R77
R62
R69
R66
R78
R63
SR117
SR118
SR119
C31
C32
C33
C22
C23
C24
Q22
Q23
Q24
C34
C35
C36
C25
C26
C27
C28
C29
C30
C59
IC3
SR121
C16
C17
C18
R49
R52
R79
R46
R43
R50
R53
R80
R47
R44
R51
R54
R81
R48
R45
Q16
Q17
Q18
R55
R56
R57
C13
C14
C15
C53
C37
C52
C38
C39
C54
IC2
C51
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
R42
R39
C5
C6
R22
R13
R19
R25
R16
R28
C7
R34
R40
R37
C2
R14
R20
R17
R26
C8
R35
R41
R38
C3
R15
R21
R18
R27
C9
R36
SR120
C4
C1
R7
R123
Q1
Q2
Q3
Q4
Q5
Q6
R10
R31
R4
R23
R8
R124
R11
P1
P2
P3
R29
R32
R5
R24
R9
R125
R12
R30
R2
R3
R33
R6
C12
R88
R87
Q27
R86
R1
C10
R82
C40
Q25
R83
C41
Z1
R84
R85
Z2
R90
R91
Q26
Q28
R89
P7
P8
P9
C11
R92
Q29
R93
R94
C6051047
100
C42
R95
Z3
Q30
R96
R97
C43
D4
R98
P10
R99
D5
R116
IC1
R106
R107
C47
D11
D12
D13
D14
R108
R109
C48
C50
Q33
D15
D16
D17
C49
Q34
R112
C57
R114
R122
C56
R105
D10
D9
D8
C45
C55
R103
R102
C58
Q31
Q32
D6
R104
D7
C44
R100
R101
R111
Z4
Z5
R113
R110
R115
CON A
2

CIRCUIT DESCRIPTION RGB OUTPUT BOARD 3

The three video signals arrive on contact A28(R), A26(G), A24(B). The circuits for red, green and blue are identical so the description will be made for red only.

The red video from contact A28 is amplified by Q1.
P1 enables a gain adjustment. After emitter follower Q4 the black level pulse is added to the video signal.

Emitter follower Q7 is followed by the clamper consisting of C7 and Q10. Q10 is normally blocked but gets saturated by the hard clamp pulse.

The clamper is followed by emitter follower Q13. The video signal is then AC coupled to emitter follower Q16 which drives the cascode output stage Q22, Q19.
On the collector of Q19 the inverted video is fed to the red cathode. P4 and L4 (20 Mhz.) and C28 (10 Mhz.) enable the frequency response adjustment.
The black level of the output signal is stabilized to the level of the soft clamp pulse by D1 and the feedback to the base of Q16.

Generation of the black level pulse

The positive brightness pulse arrives at contact A18. It is amplified by Q25 and clipped to 8.2V by Z1.
This signal is then again amplified and thus inverted by Q26 and clipped by Z2.
The amplitude of the black level pulse is adjustable by P7 P8 and P9 and is added to the three video signals via emitter follower Q27, Q28 and Q29.

Generation of the hard clamp pulse

The clamping pulse arrives at contact A12 and is inverted by IC1 (pin 4,5,6).
On contact A8, the horizontal flyback pulse arrives. It is clipped by Z3 to 9.1V.

If the clamping pulse is present at contact A12, it will also be found back at pin 3 of IC1. If it is not present on pin 3 of IC1 the negative horizontal flyback pulse will be found.

Generation of the soft clamp pulse

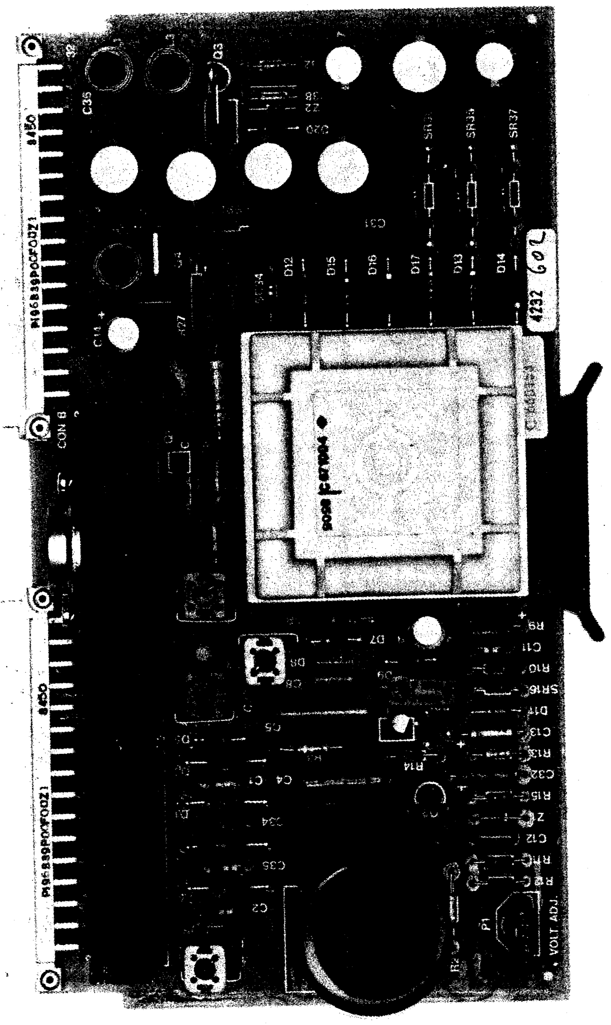
The hard clamp pulse available at the anode of D12, D13 is amplified by Q33 and clipped by D16 to 136V (Z4, Z5).
The output goes to the three video amplifiers via D17 and emitter follower Q34.

Blanking amplifier

The horizontal flyback pulse at contact A8, clipped by D18 and Z3 is differentiated by C42 saturating Q30 and switching pin 8 of IC1 to ground.
Pin 8 will remain on ground during a time adjustable by P10.
On pin 9 of IC1 inverted vertical blanking pulses arrive.
On pin 10 of IC1 composite horizontal and vertical blanking pulses are available. They are amplified by the active load combination Q31, Q33. The output signal is clamped to +12V by C45 D8 and then clipped to ground by D10. The resulting negative blanking pulses leave the board via contact A4 for the first grid of the CRT.

4 SWITCHED MODE POWER SUPPLY

C660153
C660165



CIRCUIT DESCRIPTION SWITCHED MODE POWER SUPPLY BOARD 4

The mains voltage is rectified by the bridge rectifier D1, D2, D3, D4.
300 Volt DC is obtained across C3.

Every 20 msec (for 50 Hz operation) the positive alternation at contact A14 is applied as a start pulse to the base of Q1 via D5, SR4 and C5. This start pulse turns on Q1.
Current starts flowing in the loop: primary of T1- transistor Q1- resistor R5- capacitor C3- primary of T1.
The current feedback winding (pin 5,6) of T1 supports the initial conduction of Q1 and drives Q1 into full saturation.
The current sensing resistor R5 shows the wave form of the current sawtooth in the loop.

Now the current must be interrupted. To avoid dissipation the switching off time of Q1 must be as short as possible.
This is achieved by switching C9 between the base and the emitter of Q1 by means of thyristor TH1.
The thyristor is fired as soon as the gate becomes more then 0.7 Volt positive with respect to the cathode.
This voltage is the algebraic sum of the voltage across R5 and the voltage across R9.
C9 pumps out the base emitter very fast. The current feedback winding enhances the switching off of Q1 and collector cut-off starts 4 usec later.
Thyristor TH1 is blocked as soon as the gate cathode voltage has dropped below 0.7 Volt and as soon as the anode current drops below the hold current.

During the blocking of Q1, the energy stored in the transformer T1 is delivered through the rectifier diodes at the secondary windings.
During energy transfer the current feedback winding charges C8, C9 and C10 via D7, D8, D9 and D10.
The charge across C8 is limited to 0.7 Volt by D8.
As soon as the energy transfer is carried out, the output voltage at the secondary windings falls to 0.
Now the charge of C8 will make Q1 conduct again.
This means that the power supply is oscillating.

Regulation circuit

The secondary voltage of winding 24,7 of T1 is rectified by D11, C13 and is the power supply for the regulation circuit. An adjustable amount (P1) is compared with the reference Z1 and determines the collector current of Q2.
This collector current causes a voltage drop in R9 and can be considered as a variable bias of the gate cathode of TH1. If the load on the secondary of T1 increases the voltage across C13 will be smaller.
Hence less current in the collector of Q1 will be available so the voltage across R9 will be less positive, conduction of TH1 will be reached later and more energy will be stocked in the transformer.

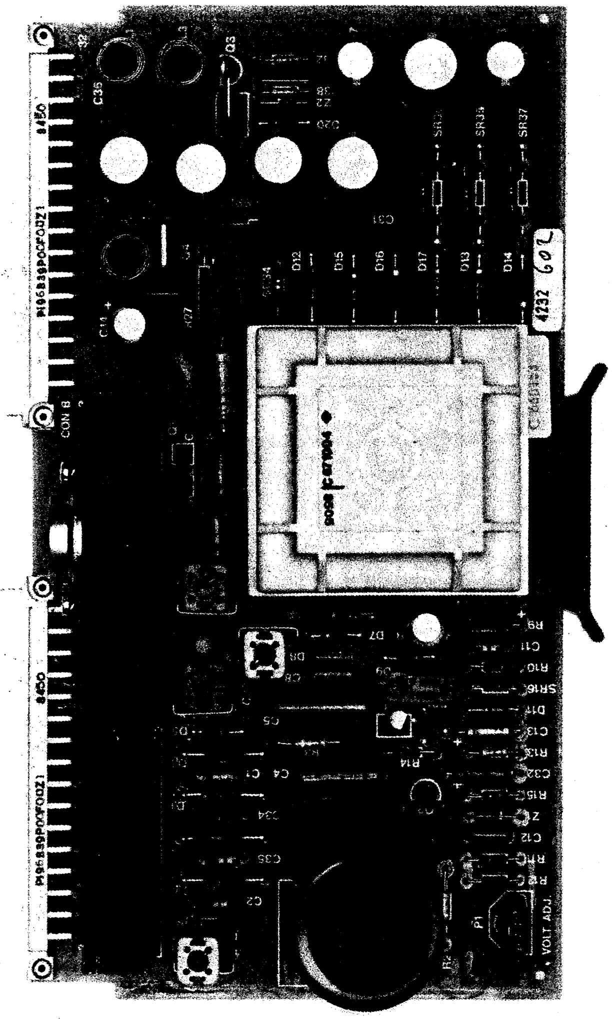
In case of short-circuit on the secondary, the power supply will start working by the start pulse, the current through the primary winding reaches its maximum value very quickly so that TH1 is very quickly fired and Q1 is switched off.
No energy is available at the secondary windings for charging the capacitors of the different loops and the power supply stops converting until a new start pulse arrives.

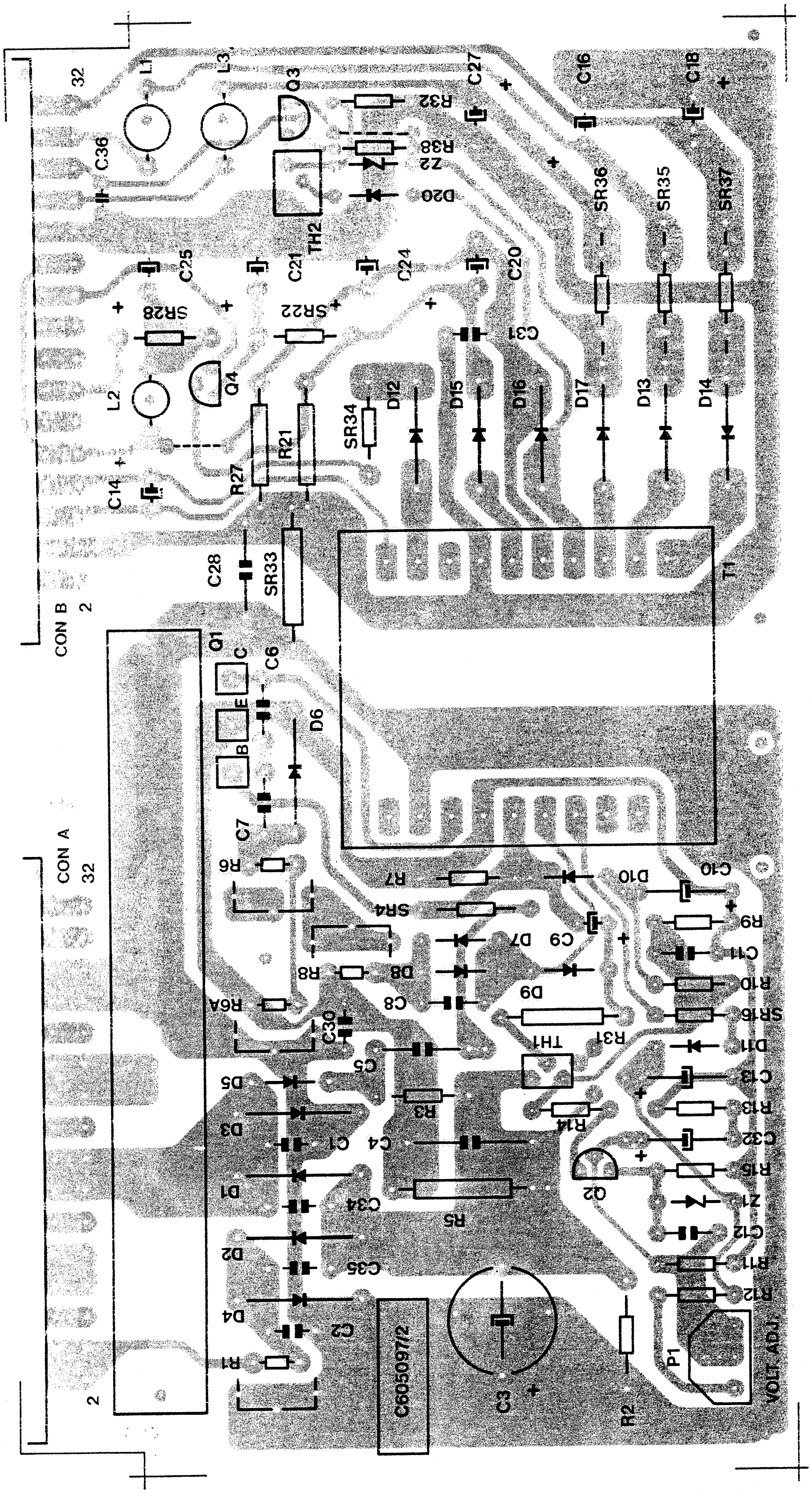
In unloaded condition which can be the case when servicing the power frequency very soon reaches high frequency so that the turn-off time of TH1 becomes important with respect to the total period. TH1 conducts too long and acts as a divider system.
Now the power supply acts again as a pulsed power supply.
The dissipation of Q1 is limited by a snugger network consisting of R6, C6, C7 and D6.

Thyristor TH2 is fired in case the +17VDC secondary reaches too high a value (limit determined by Z2) and also in case the fail safe voltage on contact B28 is positive.

4 SWITCHED MODE POWER SUPPLY

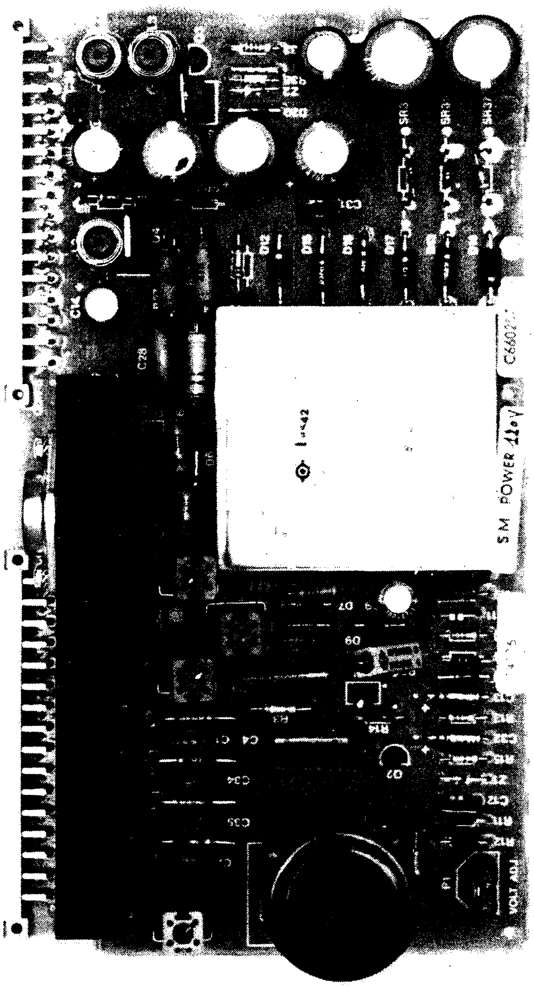
C660153
C660165

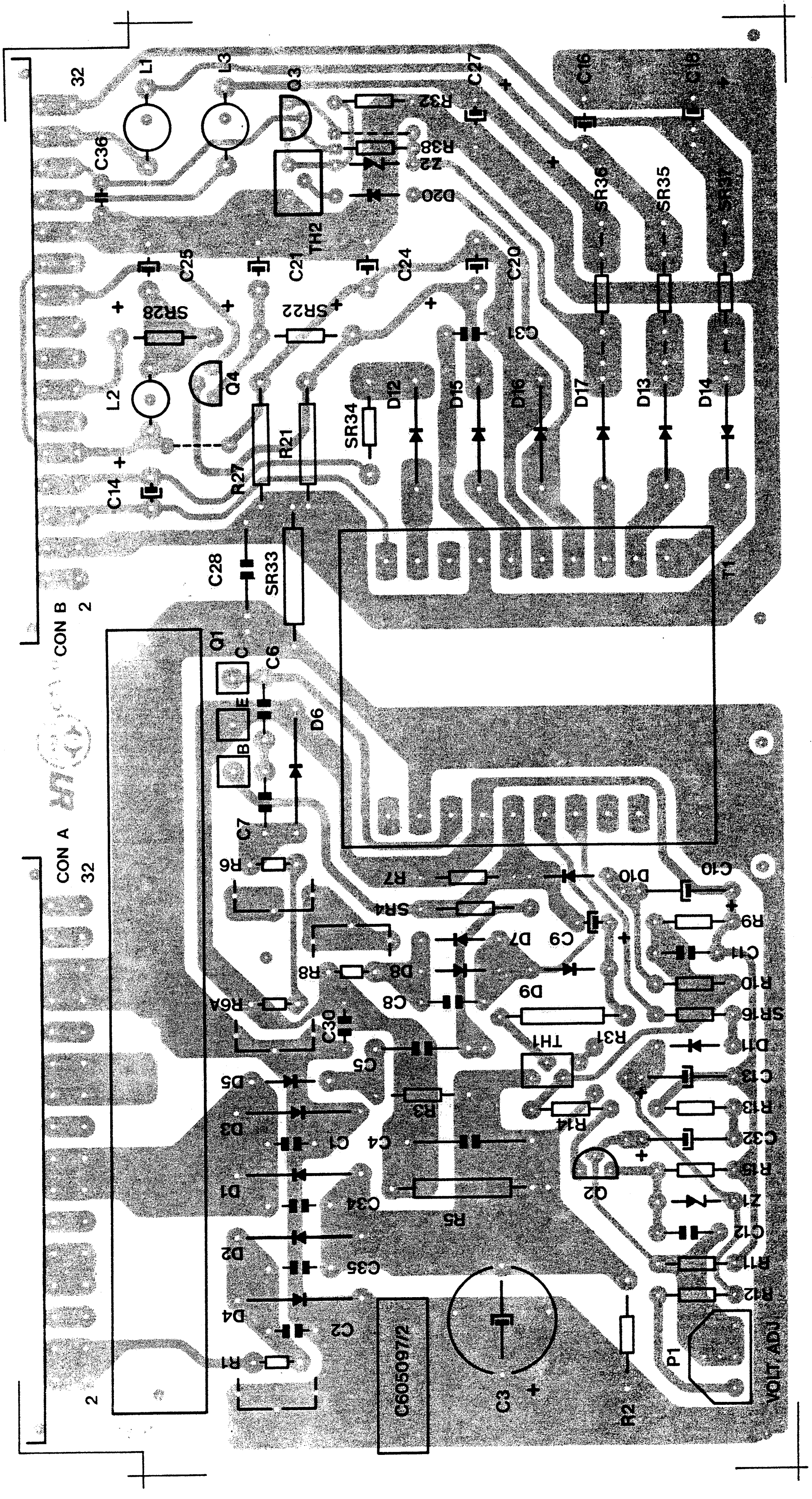

C35
Q3
SR35
SR37
D12
D15
D16
D17
D13
D14
C31
C14
CON B
R9
C11
R10
SR16
D11
C13
R13
C32
R15
C12
R14
C5
C4
C1
C33
C2
P1
VOLT ADJ.


CON A
CON B
32
2
32
2
C605097/2
VOLT. ADJ.
P1
T1
TH1
TH2
Q1
Q2
Q3
Q4
B
E
C
L1
L2
L3
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C16
C18
C20
C21
C24
C25
C27
C28
C30
C31
C32
C34
C35
C36
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
D16
D17
D20
Z1
Z2
R1
R2
R3
R5
R6
R6A
R7
R8
R9
R10
R11
R12
R13
R14
R15
R21
R27
R31
R32
R38
SR4
SR15
SR22
SR28
SR33
SR34
SR35
SR36
SR37

4 SWITCHED MODE POWER SUPPLY

C660256
C660257


C66025
S.M. POWER 110V
VOLT ADJ


CON A
32
2
CON B
2
32
C605097/2
VOLT ADJ
P1
T1
C3
R1
R2
C2
D4
C35
D2
C34
D1
C1
D3
D5
C4
R3
R5
C5
C30
R6A
R8
C8
D8
D7
D9
C9
R6
SR4
R7
D10
C10
R9
C11
R10
SR16
D11
C13
R13
C32
R15
Z1
C12
R11
R12
Q2
R14
TH1
R31
C7
D6
C6
Q1
B
E
C
SR33
C28
R27
R21
C14
L2
Q4
SR28
SR22
C25
C21
C24
C20
TH2
C36
L1
L3
Q3
R32
R38
Z2
D20
C27
C16
C15
SR36
SR35
SR37
SR34
D12
D15
D16
D17
D13
D14
C31

CIRCUIT DESCRIPTION SWITCHED MODE POWER SUPPLY BOARD 4

The mains voltage is rectified by the bridge rectifier D1, D2, D3, D4.
300 Volt DC is obtained across C3.

Every 20 msec (for 50 Hz operation) the positive alternation at contact A14 is applied as a start pulse to the base of Q1 via D5, SR4 and C5. This start pulse turns on Q1.
Current starts flowing in the loop: primary of T1- transistor Q1- resistor R5- capacitor C3- primary of T1.
The current feedback winding (pin 5,6) of T1 supports the initial conduction of Q1 and drives Q1 into full saturation.
The current sensing resistor R5 shows the wave form of the current sawtooth in the loop.

Now the current must be interrupted. To avoid dissipation the switching off time of Q1 must be as short as possible.
This is achieved by switching C9 between the base and the emitter of Q1 by means of thyristor TH1.
The thyristor is fired as soon as the gate becomes more then 0.7 Volt positive with respect to the cathode.
This voltage is the algebraic sum of the voltage across R5 and the voltage across R9.
C9 pumps out the base emitter very fast. The current feedback winding enhances the switching off of Q1 and collector cut-off starts 4 usec later.
Thyristor TH1 is blocked as soon as the gate cathode voltage has dropped below 0.7 Volt and as soon as the anode current drops below the hold current.

During the blocking of Q1, the energy stored in the transformer T1 is delivered through the rectifier diodes at the secondary windings.
During energy transfer the current feedback winding charges C8, C9 and C10 via D7, D8, D9 and D10.
The charge across C8 is limited to 0.7 Volt by D8.
As soon as the energy transfer is carried out, the output voltage at the secondary windings falls to 0.
Now the charge of C8 will make Q1 conduct again.
This means that the power supply is oscillating.

Regulation circuit

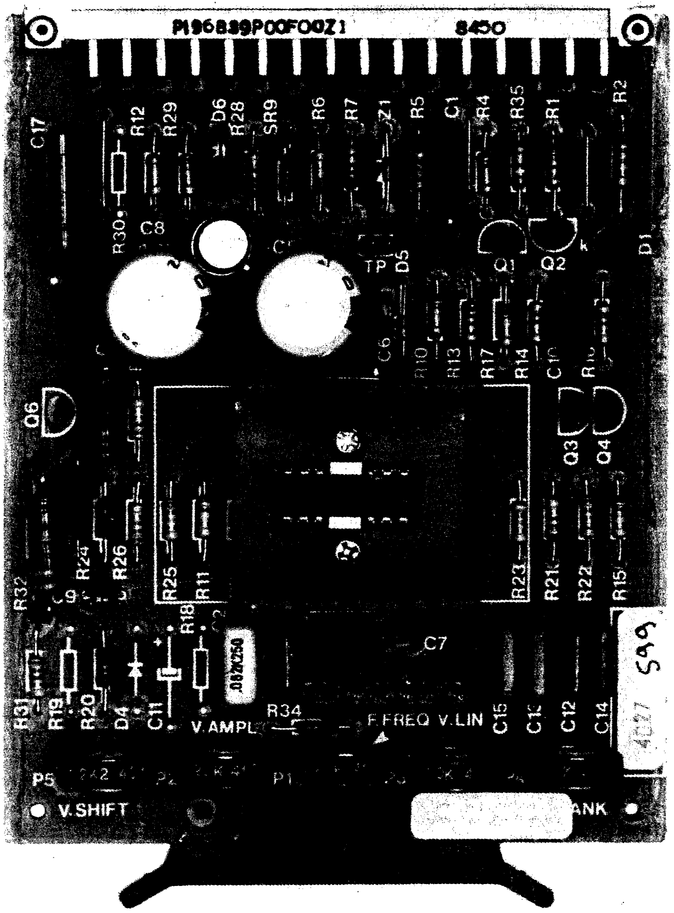
The secondary voltage of winding 24,7 of T1 is rectified by D11, C13 and is the power supply for the regulation circuit. An adjustable amount (P1) is compared with the reference Z1 and determines the collector current of Q2.
This collector current causes a voltage drop in R9 and can be considered as a variable bias of the gate cathode of TH1. If the load on the secondary of T1 increases the voltage across C13 will be smaller.
Hence less current in the collector of Q1 will be available so the voltage across R9 will be less positive, conduction of TH1 will be reached later and more energy will be stocked in the transformer.

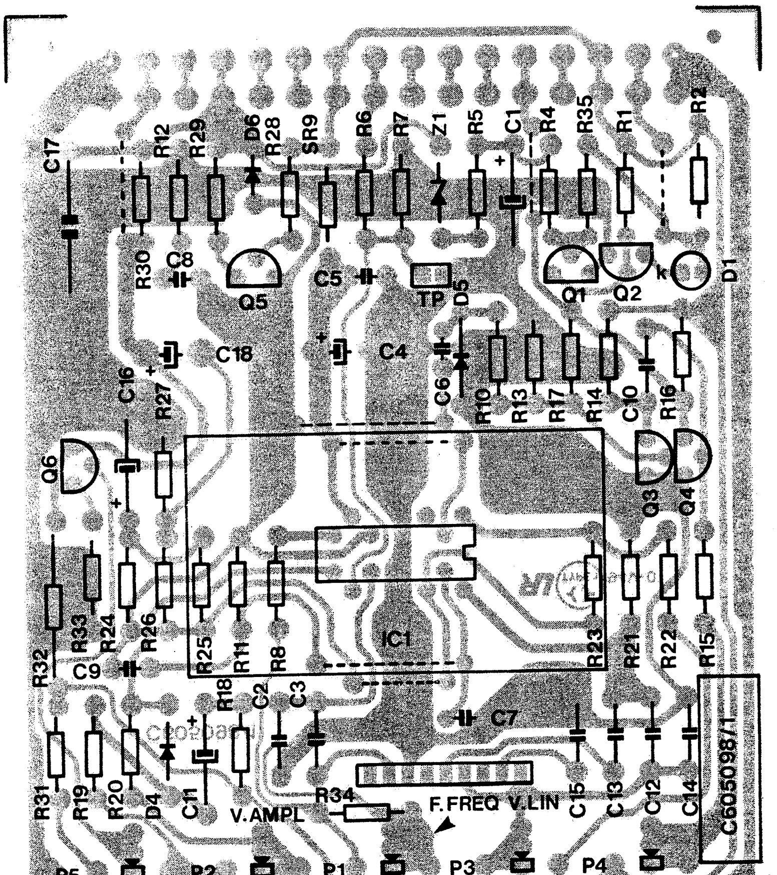
In case of short-circuit on the secondary, the power supply will start working by the start pulse, the current through the primary winding reaches its maximum value very quickly so that TH1 is very quickly fired and Q1 is switched off.
No energy is available at the secondary windings for charging the capacitors of the different loops and the power supply stops converting until a new start pulse arrives.

In unloaded condition which can be the case when servicing the power frequency very soon reaches high frequency so that the turn-off time of TH1 becomes important with respect to the total period. TH1 conducts too long and acts as a divider system.
Now the power supply acts again as a pulsed power supply.
The dissipation of Q1 is limited by a snugger network consisting of R6, C6, C7 and D6.

Thyristor TH2 is fired in case the +17VDC secondary reaches too high a value (limit determined by Z2) and also in case the fail safe voltage on contact B28 is positive.

5 VERTICAL DEFLECTION C660148


P196839P00F00Z1
8450
C17
R12
R29
D6
R28
SR9
R6
R7
Z1
R5
C1
R4
R35
R1
R2
R30
C8
TP
D5
Q1
Q2
D1
C6
R10
R13
R17
R14
Q6
Q3
Q4
R32
R24
R26
R25
R11
R23
R21
R22
R15
R18
C7
R31
R19
R20
D4
C11
V.AMPL
R34
F.FREQ
V.LIN
C15
C12
C14
P5
P1
V.SHIFT
599
4027


C17
R12
R29
D6
R28
SR9
R6
R7
Z1
R5
C1
R4
R35
R1
R2
R30
C8
Q5
C5
TP
D5
Q1
Q2
k
D1
C18
C4
C16
R27
C6
R10
R13
R17
R14
C10
R16
Q6
Q3
Q4
R32
R33
R24
R26
C9
R25
R11
R8
IC1
R23
R21
R22
R15
R18
C2
C3
C7
R31
R19
R20
D4
C11
V.AMPL
R34
F.FREQ
V.LIN
C15
C13
C12
C14
C605098/1
P5
P2
P1
P3
P4
V.SHIFT
V.BLANK

CIRCUIT DESCRIPTION VERTICAL DEFLECTION BOARD 5

The vertical deflection is made by IC1 (TDA 1170SH).
The vertical sync pulses arrives at contact 16.
Vertical free running frequency is adjusted by P1, vertical amplitude by P2 and vertical linearity by P3.
The vertical scan range jumper allows selection of 2 ranges, 50-60 Hz and 70-80 Hz. It adapts the vertical frequency and the vertical linearity.

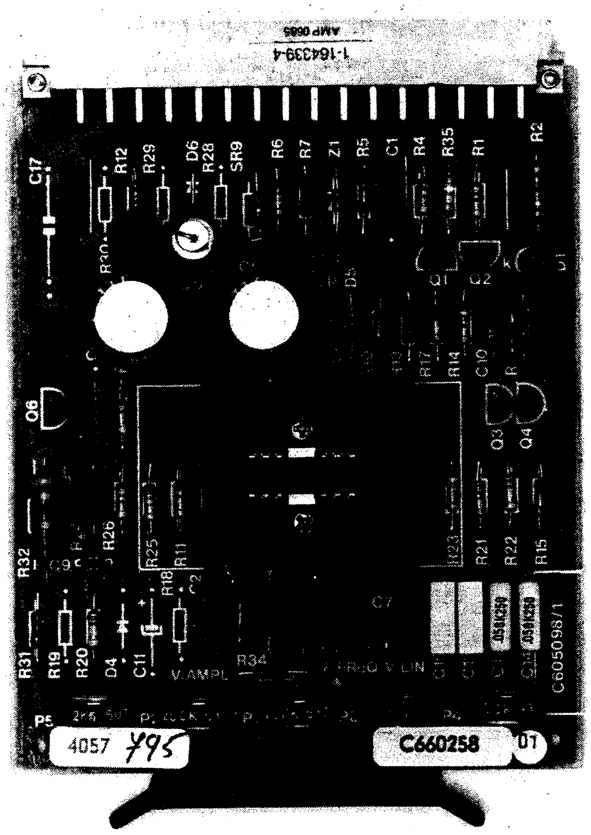
The vertical deflection coil is connected between contact 8 and 4.

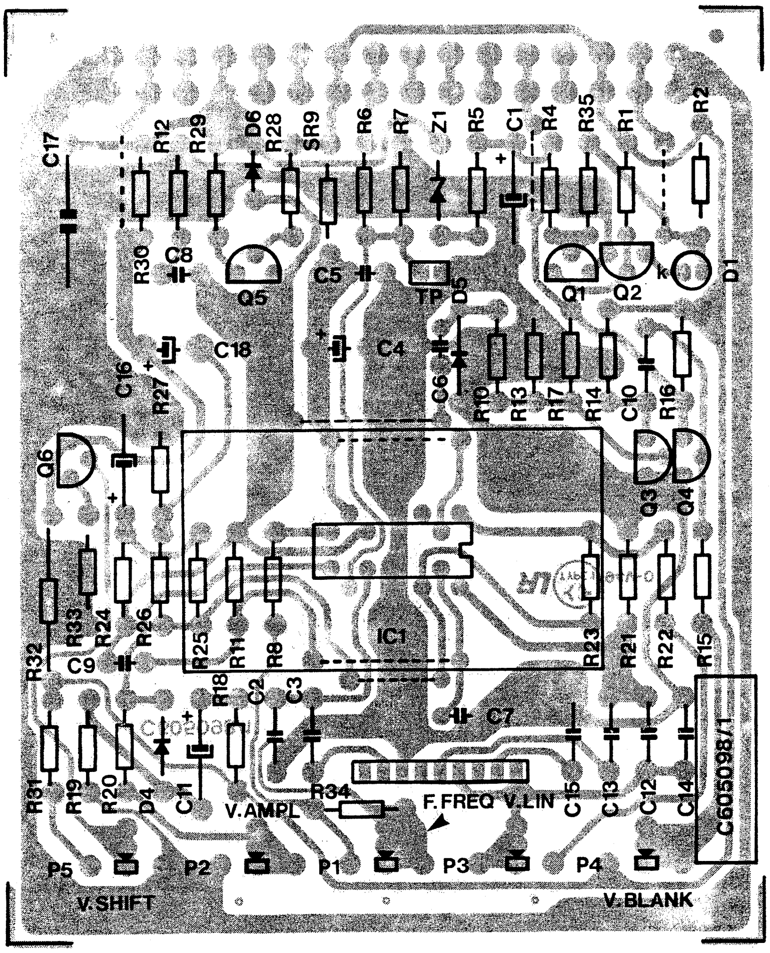
The pulse at pin 4 of IC1 triggers monostable multivibrator Q3, Q4. The resulting output pulse at collector of Q4 is the vertical blanking pulse of which the duration is adjustable by P4. It leaves the board at contact 24.

During normal operation, the flyback pulses at the cathode of D6 are large enough to saturate Q3 via the Z-diode Z1 (36 Volt).
If Q1 is saturated Q2 is blocked and LED D1 is off.
If the pulses are not high enough then Q1 is blocked and Q2 is saturated so LED D1 is on and contact 30 is low.

Vertical shift is provided by P5 which gives an adjustable DC current in the vertical deflection coil via Q6.

5 VERTICAL DEFLECTION C660258


1-164339-4
AMP 0685
C17
R12
R29
D6
R28
SR9
R6
R7
Z1
R5
C1
R4
R35
R1
R2
Q1
Q2
R17
R14
C10
Q6
Q3
Q4
R26
R25
R11
R23
R21
R22
R15
R32
R31
R19
R20
D4
C11
R18
V. AMPL
R34
C7
FREQ V LIN
C605098/1
P5
4057 795
C660258
01


C17
R12
R29
D6
R28
SR9
R6
R7
Z1
R5
C1
R4
R35
R1
R2
R30
C8
Q5
C5
TP
D5
Q1
Q2
k
D1
C18
C4
C16
R27
C6
R10
R13
R17
R14
C10
R16
Q6
Q3
Q4
IC1
R32
R33
R24
R26
R25
R11
R8
R23
R21
R22
R15
C9
R18
C2
C3
C7
R31
R19
R20
D4
C11
V.AMPL
R34
F.FREQ
V.LIN
C15
C13
C12
C14
C605098/1
P5
P2
P1
P3
P4
V.SHIFT
V.BLANK

CIRCUIT DESCRIPTION VERTICAL DEFLECTION BOARD 5

The vertical deflection is made by IC1 (TDA 1170S). The vertical sync pulses arrives at contact 16.
Vertical free running frequency is adjusted by P1, vertical amplitude by P2 and vertical linearity by P3.
The vertical scan range jumper allows selection of 2 ranges, 50-60 Hz and 70-80 Hz. It adapts the vertical frequency and the vertical linearity.

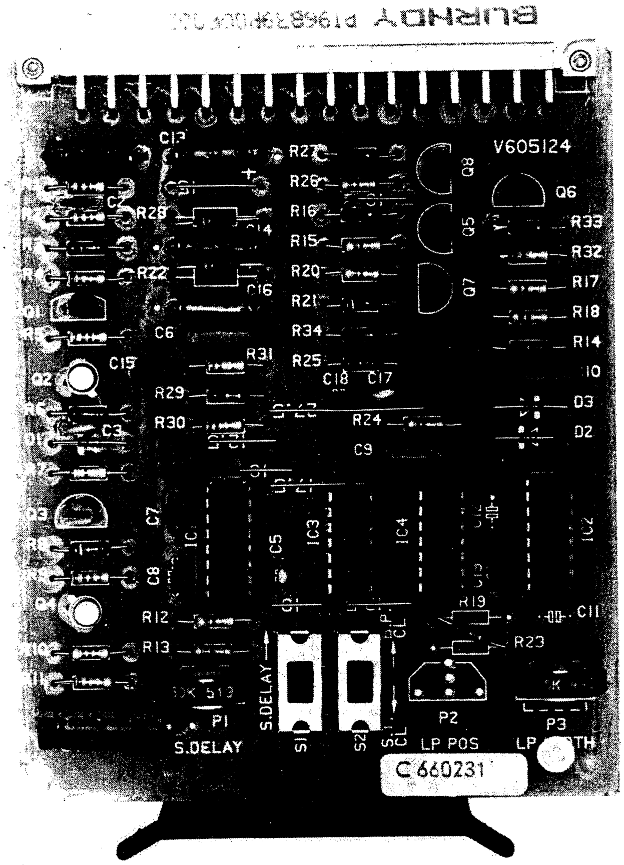
The vertical deflection coil is connected between contact 8 and 4. Q5, D6, R28, R29 and C17 provide a flyback generator in order to obtain a short flyback.

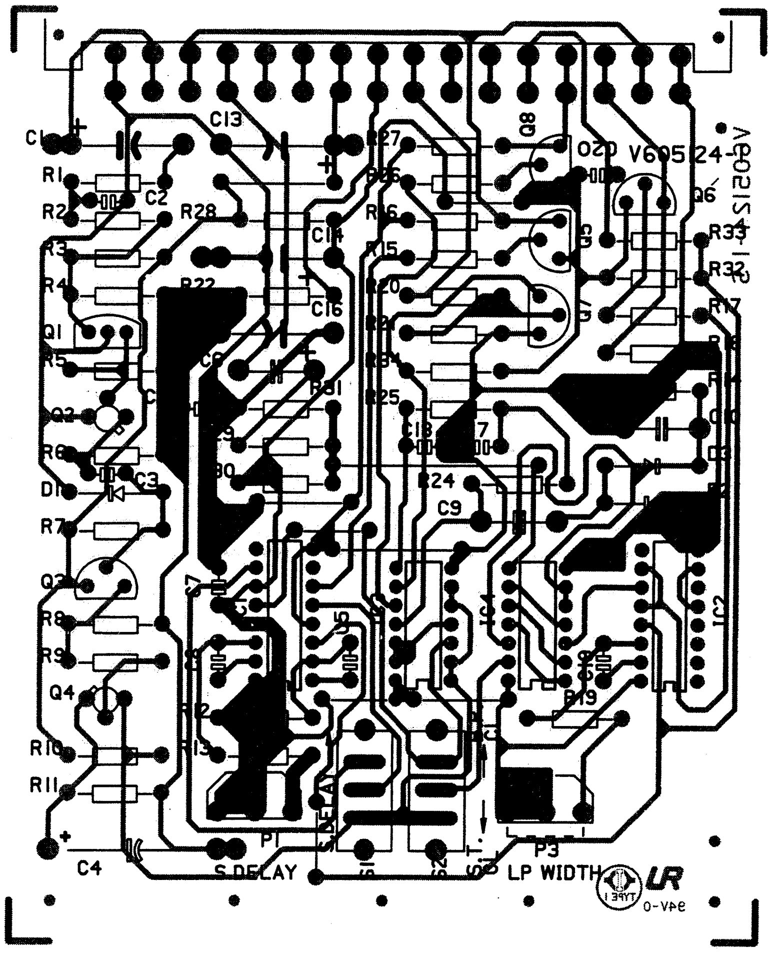
The pulse at pin 4 of IC1 triggers monostable multivibrator Q3, Q4. The resulting output pulse at collector of Q4 is the vertical blanking pulse of which the duration is adjustable by P4. It leaves the board at contact 24.

During normal operation, the flyback pulses at the cathode of D6 are large enough to saturate Q3 via the Z-diode Z1 (36 Volt).
If Q1 is saturated Q2 is blocked and LED D1 is off.
If the pulses are not high enough then Q1 is blocked and Q2 is saturated so LED D1 is on and contact 30 is low.

Vertical shift is provided by P5 which gives an adjustable DC current in the vertical deflection coil via Q6.

6 SYNC PROCESSOR C660231


BURNDY
V605124
C12
R27
R26
R16
R15
R20
R21
R34
R25
R28
R22
C14
C16
C6
C15
C18
C17
R31
R29
R30
R24
C9
Q8
Q5
Q7
Q6
R33
R32
R17
R18
R14
D3
D2
C2
C3
C7
C8
Q1
Q2
Q3
Q4
IC1
C5
IC3
IC4
IC2
R19
C11
R23
R12
R13
10K 519
P1
S.DELAY
S.DELAY
S1
S2
CL
P2
LP POS
P3
LP WIDTH
C 660231


C1
C13
R27
Q8
R26
O20
V605 24-
Q6
R1
R2
C2
R28
R16
R33
R3
C14
R15
R32
R4
R22
R20
R17
C16
Q1
R5
C6
R31
R25
Q2
C18
R24
R6
C3
D1
C9
R7
Q3
R8
R9
Q4
R12
R13
R10
R11
R19
C4
P1
S DELAY
P3
LP WIDTH
94V-0

CIRCUIT DESCRIPTION SYNC BOARD $\boxed{6}$

Horizontal sync

The composite sync or sync on green arrives on contact 4.
After low pass filter R1, R2 and C2, common base amplifier Q1 and emitter follower Q2, the signal is clamped by C3, D1 followed by the high input impedance of Q3.
The sync is separated by DC amplifier Q4 and inverted by IC3a.
The leading edge triggers the monostable multivibrator IC1b of which the output pulse duration is adjustable by P1.
S1 selects between inverted sync from the collector of Q4 or the positive delayed pulse from pin 10 of IC1b to trigger IC1a, the horizontal sync pulse former.
The composite horizontal sync or the delayed horizontal sync is buffered by Q5 and leaves the board at contact 30.

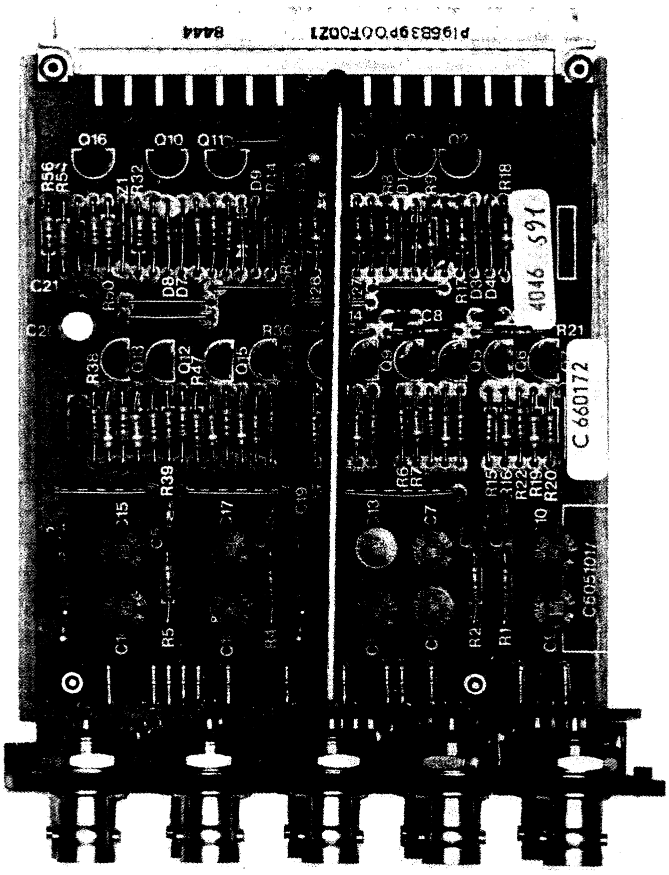
Vertical sync

After the buffer IC3b - IC3d, the vertical sync is separated by a double integration R24, C17, R25 and C18.
On contact 18, the external vertical sync if applied, is available.
It is inverted by Q7 and arrives at pin 9 of IC3c. On pin 10 we find negative going vertical sync (external or internal). After emitter follower Q8, the vertical sync leaves the board on contact 26.

Brightness pulse generator

The 4 NAND gates of IC4 are used as a switch. Normally the sync pulses at pin 11 of IC3d are rectified causing a high on pin 5, 6 of IC4. The pulses of pin 13 of IC4d are found on pin 3.
The switch S2 selects between positive sync pulses (back porch clamping) and negative sync pulses (sync tip clamping). The negative going edge triggers the monostable multivibrator IC2b of which the output pulse duration is adjustable by P3.
The trailing edge of the output pulse at pin 7 triggers the multivibrator IC2a which gives the brightness pulse at pin 10. The horizontal drive pulses at contact 24 block the brightness pulses derived from the equalizing pulses. The brightness pulse leaves the board at contact 28 via emitter follower Q6.
If no sync pulses are present at pin 11, the brightness pulses are derived from the negative flyback pulse at contact 8.

7 RGB INPUT C660172


Q16
Q10
Q11
R56
R54
R32
D9
R18
C21
R50
D8
D7
R28
4046 591
C 660172
C20
R30
R36
Q13
Q12
R47
Q15
Q9
Q6
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R22
R19
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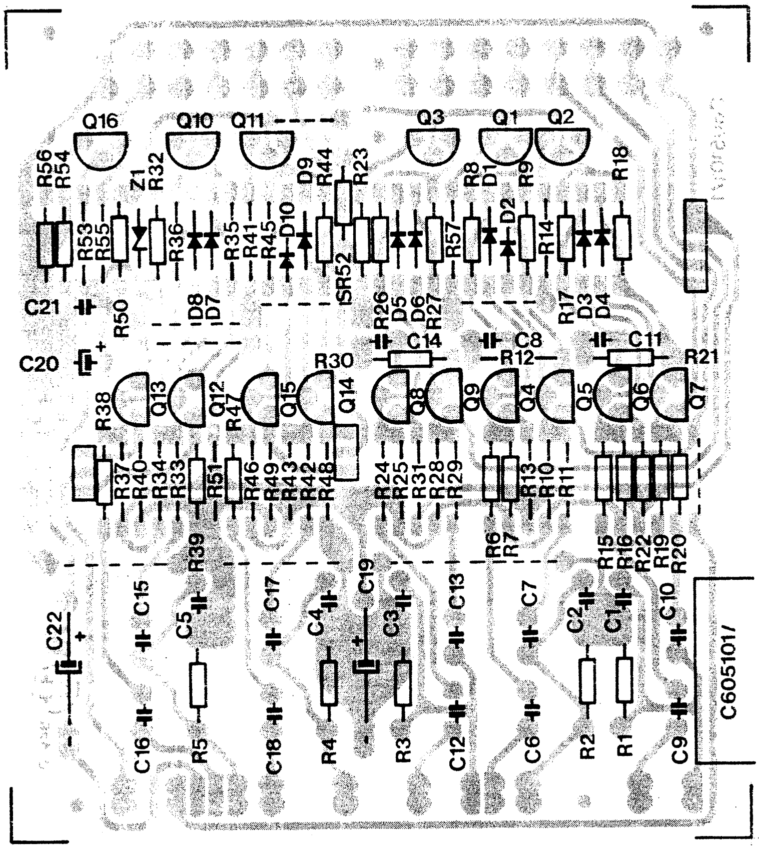
C7
R5
R4
R2
R1
C6051017


Q16
Q10
Q11
Q3
Q1
Q2
R56
R54
Z1
R32
D9
R44
R23
R8
D1
R9
R18
R53
R55
R36
R35
R41
R45
D10
SR52
R26
D5
D6
R27
R57
D2
R14
R17
D3
D4
C21
R50
ID8
ID7
C20
C14
C8
C11
R12
R30
R21
R38
Q13
Q12
R47
Q15
Q14
Q8
Q9
Q4
Q5
Q6
Q7
R37
R40
R34
R33
R51
R46
R49
R43
R42
R48
R24
R25
R31
R28
R29
R13
R10
R11
R6
R7
R15
R16
R22
R19
R20
R39
C22
C15
C5
C17
C4
C19
C3
C13
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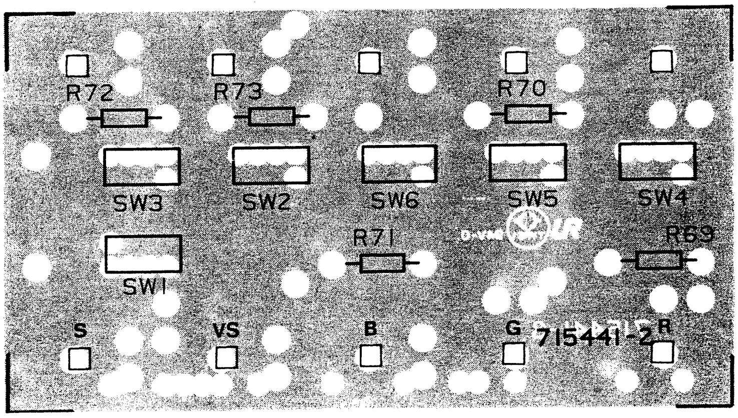
C12
C6
R2
R1
C9


R72
R73
R70
SW3
SW2
SW6
SW5
SW4
R71
R69
SW1
S
VS
B
G
R
715441-2

CIRCUIT DESCRIPTION RGB INPUT BOARD $\boxed{7}$

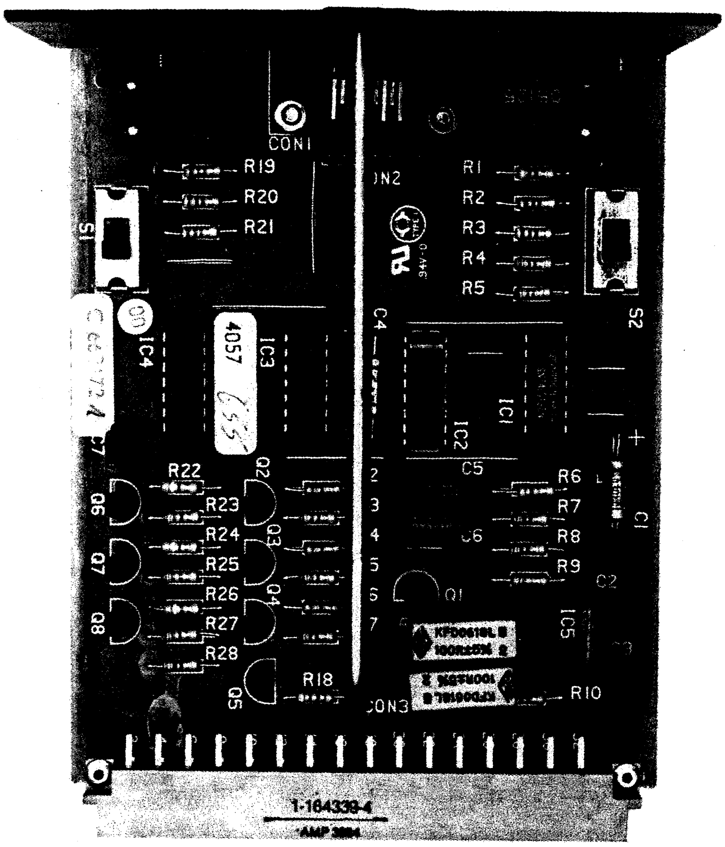
The RGB signals arrive at the input connectors on the rear of the display. They can be terminated by means of the termination switch. From the sockets, they go to a differential input amplifier of which the output is connected to contact 26, 28 and 30.

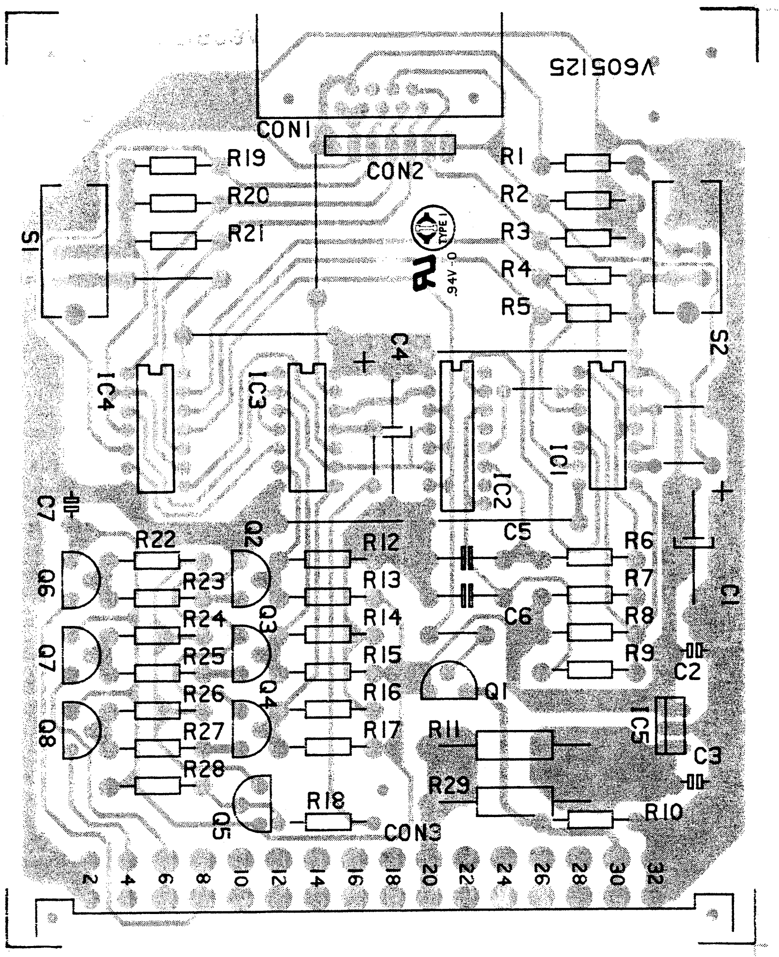
The input connectors for sync can also be terminated by means of a switch and are connected to a differential amplifier Q10, Q12, Q13. The jumper allows operation with positive or negative going sync.

Switch S2 allows the selection of external sync or sync from the green video input. After emitter follower Q16 the selected sync source leaves the board via contact 4.

The input connectors for vertical sync can also be terminated by means of the switch S6 and are connected to the differential input amplifier Q11, Q14, Q15.
A jumper allows the selection of positive or negative sync. The external vertical sync is available at contact 12.

7 TTL INPUT C6601721


CON1
CON2
CON3
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
S1
S2
IC1
IC2
IC3
IC4
IC5
4057
C55
C 6601721
C1
C2
C4
C5
C6
C7
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
2
3
4
5
6
7
+
1-164339-4
AMP 3984


V605125
CON1
CON2
CON3
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
C1
C2
C3
C4
C5
C6
C7
IC1
IC2
IC3
IC4
IC5
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
S1
S2
94V-0
TYPE 1
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32

CIRCUIT DESCRIPTION TTL INPUT BOARD $\boxed{7}$

The +17V is regulated to +5V by IC5.
R, G, B TTL level signals enter at pin 3, 4, 5 of connector 1.

The circuit for R, G, B is identical. The description is made for R only.

First the polarity is selected by putting a high or a low on pin 4 of IC4a.
The output at pin 6 should be positive.

The signal is interrupted by NAND IC3b which receives the sync on pin 4. The amplitude is about 3Vpp.

The amplitude of the signal is reduced to 1Vpp by the division R22, R23 in the emitter of Q2.

The signal is buffered by Q6.

The DC-level of the output signal depends on the status of the intensity line on contact 6.

If contact 6 is high, pin 11 is at +5V as well as the emitter of Q5 (high brightness).

If contact 6 is low, pin 11 is at 0V and the emitter of Q5 is at a lower DC level (low brightness).

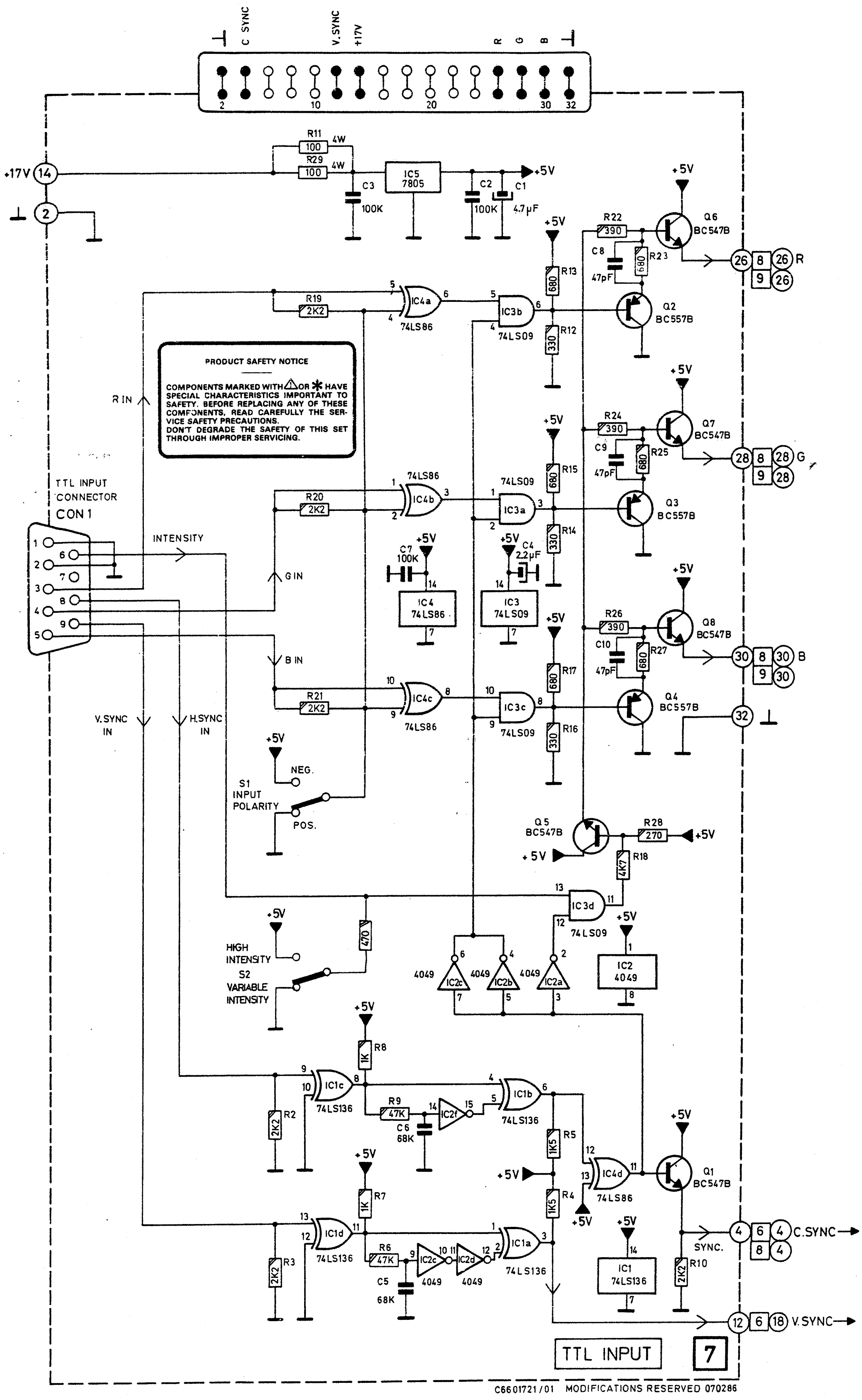
The action of the intensity line is always interrupted by the sync via pin 12 of IC3d.

The horizontal or composed sync input from contact 8 of the input connector is not inverted by EXOR IC1c. The second EXOR IC1b acts as a polarity switch resulting in a negative signal at the output.
Q1 buffers the horizontal or composite sync.

When a separate sync is available, this signal goes through EXOR IC1d and IC1a to the sync processor.

S2 connects normally R1 to ground (variable intensity operation).
If no intensity line is used, the signal can be switched to high intensity by connecting R1 to +5V.

R	2,3,11,29,19,20,21,1, 8,7, 9.6, 13,12.15,14.17,16.5.4, 22.24,26,18,23,25,27,28,10
C	3 7,6,5, 2 1 4 8.9,10
MISC.	IC5 IC4 IC3 Q5. IC2,Q2,Q3,Q4 Q6,Q7,Q8


C SYNC
V. SYNC
+17V
R
G
B
2
10
20
30
32
+17V
14
2
R11
100
4W
R29
100
4W
C3
100K
IC5
7805
C2
100K
C1
4.7µF
+5V
R22
390
R23
680
C8
47pF
Q6
BC547B
R13
680
R12
330
Q2
BC557B
26
8
26
R
9
26
R19
2K2
IC4a
74LS86
IC3b
74LS09
R IN
TTL INPUT
CONNECTOR
CON 1
INTENSITY
G IN
B IN
R24
390
R25
680
C9
47pF
Q7
BC547B
R15
680
R14
330
Q3
BC557B
28
8
28
G
9
28
R20
2K2
IC4b
74LS86
IC3a
74LS09
C7
100K
IC4
74LS86
C4
2.2µF
IC3
74LS09
R26
390
R27
680
C10
47pF
Q8
BC547B
R17
680
R16
330
Q4
BC557B
30
8
30
B
9
30
32
R21
2K2
IC4c
74LS86
IC3c
74LS09
V. SYNC
IN
H.SYNC
IN
S1
INPUT
POLARITY
NEG.
POS.
Q5
BC547B
R28
270
R18
4K7
IC3d
74LS09
HIGH
INTENSITY
S2
VARIABLE
INTENSITY
470
4049
IC2c
4049
IC2b
4049
IC2a
IC2
4049
R8
1K
IC1c
74LS136
R2
2K2
R9
47K
IC2f
C6
68K
IC1b
74LS136
R5
1K5
IC4d
74LS86
R4
1K5
Q1
BC547B
R7
1K
IC1d
74LS136
R3
2K2
R6
47K
IC2c
4049
IC2d
4049
C5
68K
IC1a
74LS136
IC1
74LS136
SYNC.
R10
2K2
4
6
4
C.SYNC
8
4
12
6
18
V.SYNC

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

TTL INPUT

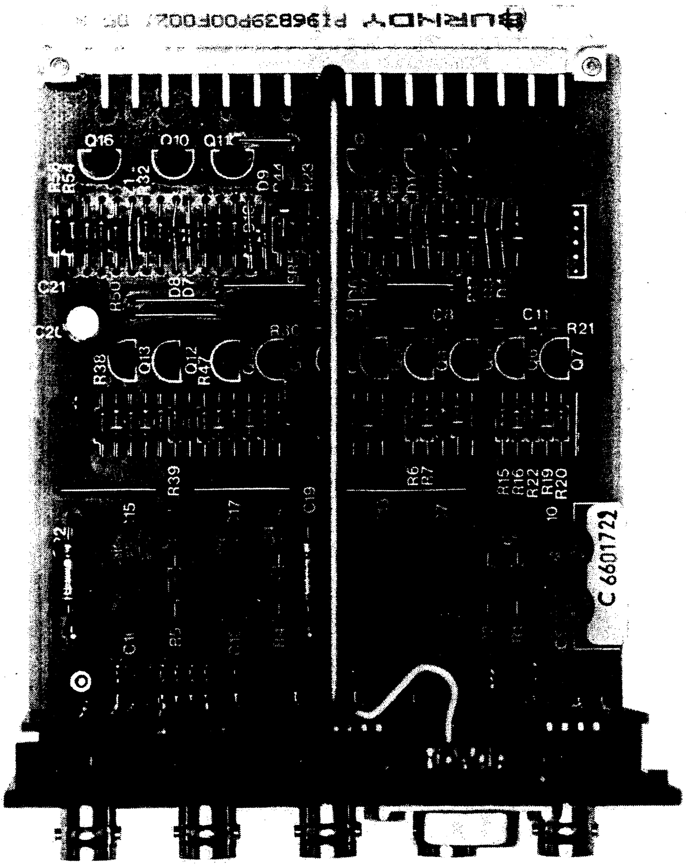
7

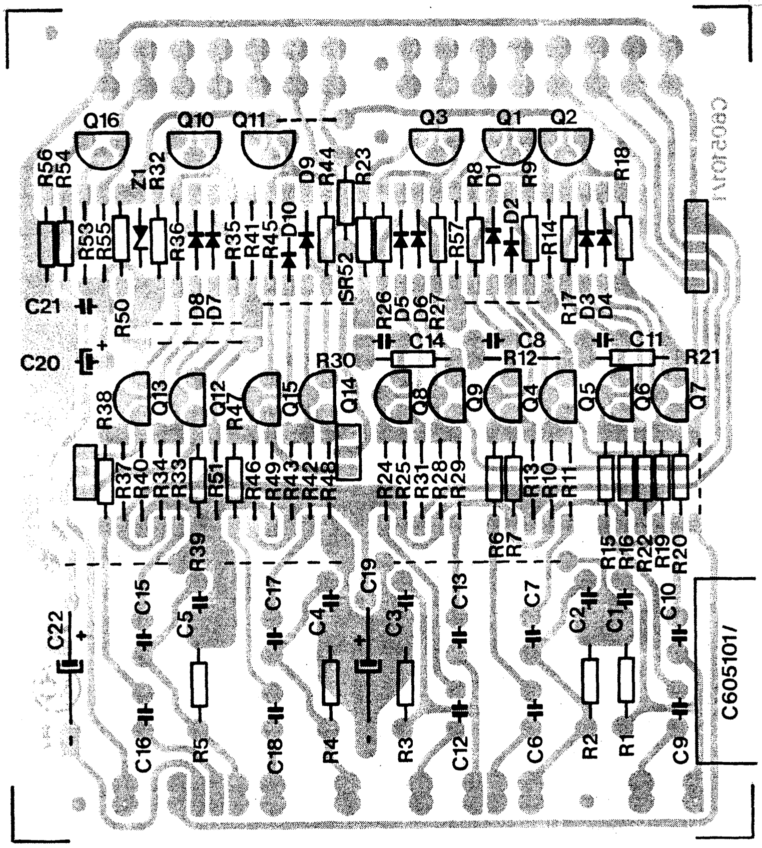
PARTS LIST OF UNIT 7
TTL INPUT
Order number of a complete unit: C6601721

Order number	Description	Item
V101129	RRCF 270E J 0.25	R28
V101130	RRCF 330E J 0.25	R12 ,R14 ,R16
V101131	RRCF 390E J 0.25	R22 ,R24 ,R26
V101132	RRCF 470E J 0.25	R1
V101134	RRCF 680E J 0.25	R13 ,R15 ,R17 ,R23 ,R25 ,R27
V101136	RRCF 1K J 0.25	R7 ,R8
V101138	RRCF 1K5 J 0.25	R4 ,R5
V101140	RRCF 2K2 J 0.25	R10 ,R19 ,R2 ,R20 ,R21 ,R3
V101144	RRCF 4K7 J 0.25	R18
V101156	RRCF 47K J 0.25	R6 ,R9
V103636	RRWW H100E J 4.00	R11 ,R29
V111196	CELAX 2M2 Z 63	C4
V111197	CELAX 4M7 Z 63	C1
V112238	CNPO MI 47P G5 63	C10 ,C8 ,C9
V1127781	CCE MI100K S5 63	C2 ,C3 ,C7
V114040	CPOMEPO 68K K 250	C5 ,C6
V1314071	SMCTRA BC 547 B	Q1 ,Q5 ,Q6 ,Q7 ,Q8
V1314131	SMCTRA BC 557 B	Q2 ,Q3 ,Q4
V134001	SMCICLVOL LM 340T 5	IC5
V137324	SMCICD 4049 B	IC2
C137494	SMCICD 74LS86	IC4
C137500	SMCIC 74LS136	IC1
C137507	SMCICD 74LS 09	IC3
C313276	CON MOB TE 2.54 P10	CON2
C313516	CON FOB SE DSUB P 9	CON1
C313590	CON MOB SE AU C P32	CON3
C324159	SWITCH SLIDE 2U	S1
V600231	FRONTPLATE TTL CD351	
V605125	TTL INPUT CD 351	PRINTED CIRCUIT BOARD
C714175	FIXPC VID.INPUT 02	
V750445	P.S. BRACKET PIECE	

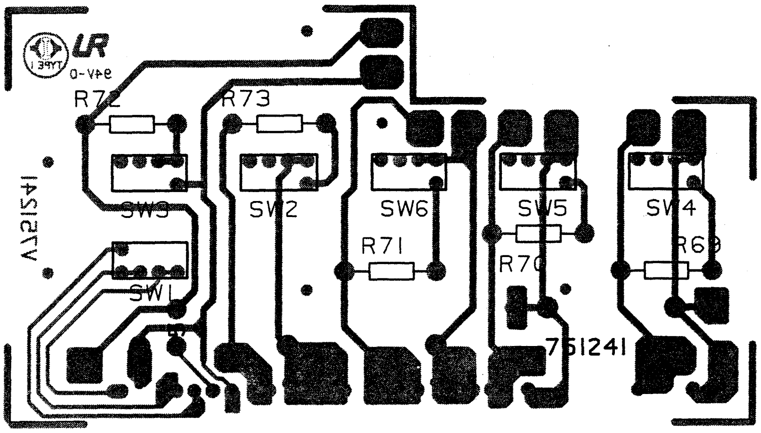
7 RGB ANALOG BNC/D INPUT

C6601722


BURNDY P1968 39P00F00Z
Q16
Q10
Q11
R53
R54
R32
D9
D44
C21
C20
R50
D8
D7
R30
R38
Q13
Q12
R47
C8
C11
R21
Q7
R39
C19
R6
R7
R15
R16
R22
R19
R20
C 6601722



C605101/
C605101/
Q16
Q10
Q11
Q3
Q1
Q2
R56
R54
Z1
R32
D9
R44
R23
R8
D1
R9
R18
R53
R55
R36
R35
R41
R45
D10
SR52
R26
D5
D6
R27
R57
D2
R14
R17
D3
D4
C21
R50
ID8
ID7
C14
C8
C11
C20
R30
R12
R21
R38
Q13
Q12
R47
Q15
Q14
Q8
Q9
Q4
Q5
Q6
Q7
R37
R40
R34
R33
R51
R46
R49
R43
R42
R48
R24
R25
R31
R28
R29
R13
R10
R11
R6
R7
R15
R16
R22
R19
R20
R39
C15
C17
C19
C13
C7
C2
C1
C10
C22
C5
C4
C3
C16
R5
C18
R4
R3
C12
C6
R2
R1
C9



LR
94V-0
R72
R73
SW3
SW2
SW6
SW5
SW4
R71
R70
R69
SW1
751241

CIRCUIT DESCRIPTION RGB INPUT BOARD 7

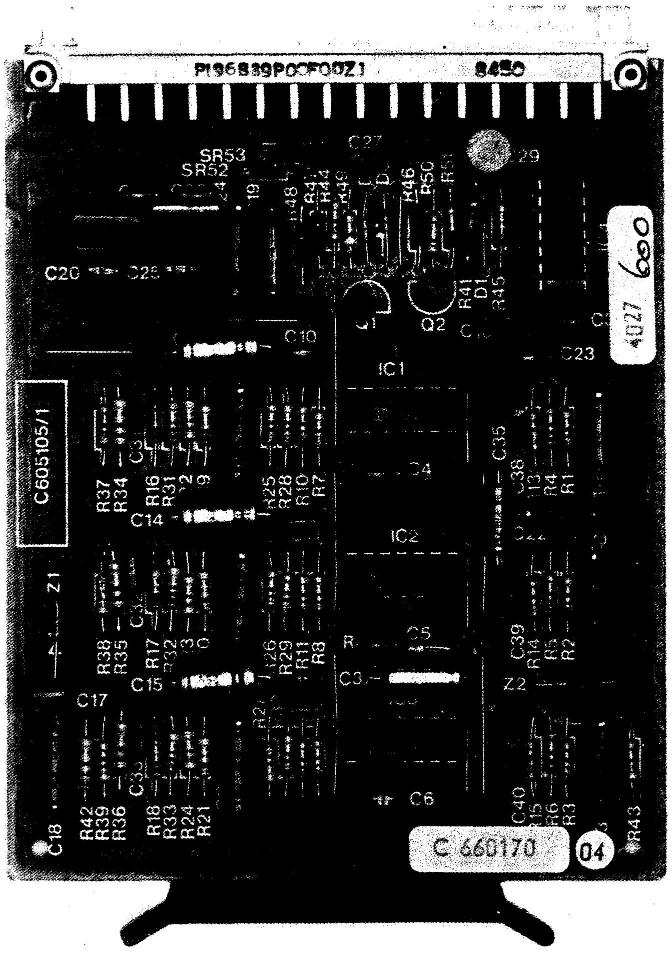
The RGB signals arrive at the input connectors on the rear of the display. They can be terminated by means of the termination switch. From the sockets, they go to a differential input amplifier of which the output is connected to contact 26, 28 and 30.

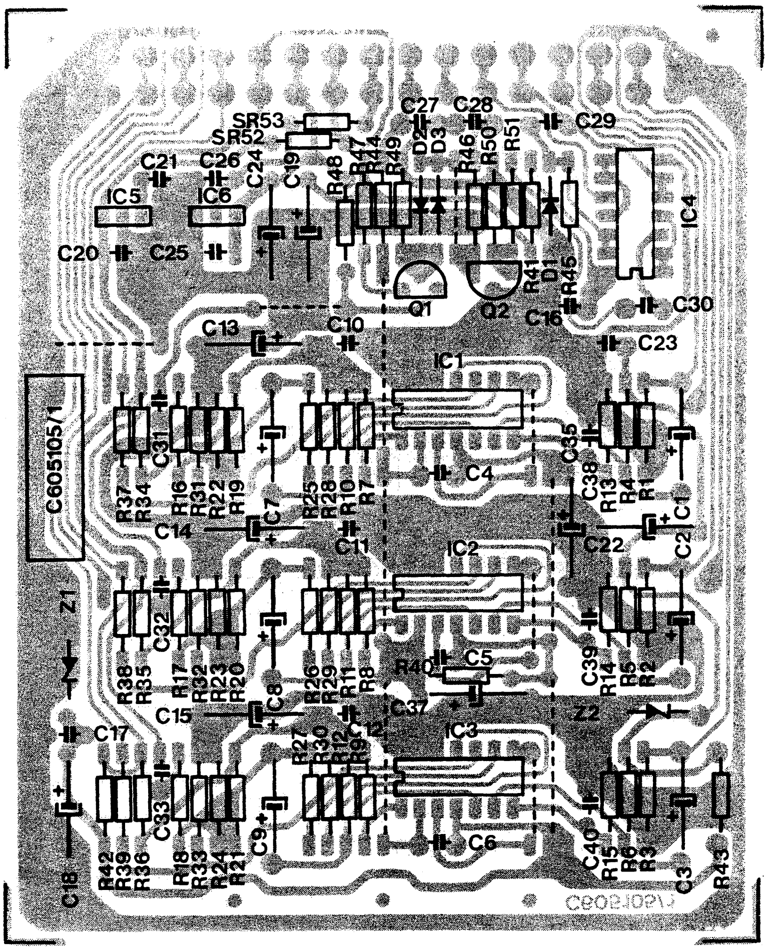
The input connectors for sync can also be terminated by means of a switch and are connected to a differential amplifier Q10, Q12, Q13. The jumper allows operation with positive or negative going sync.

Switch S2 allows the selection of external sync or sync from the green video input. After emitter follower Q16 the selected sync source leaves the board via contact 4.

The input connectors for vertical sync can also be terminated by means of the switch S6 and are connected to the differential input amplifier Q11, Q14, Q15.
A jumper allows the selection of positive or negative sync. The external vertical sync is available at contact 12.

9 CONTRAST & BRIGHTNESS C660170


P196839P0CF00Z1
8450
SR53
SR52
C27
C29
C20
C25
C10
Q1
Q2
R41
D1
R45
R46
C23
IC1
4027
600
C605105/1
R37
R34
R16
R31
C14
R25
R28
R10
R7
C35
C38
R4
R1
C4
IC2
Z1
R38
R35
R17
R32
C15
R26
R29
R11
R8
C5
C3
C39
R14
R5
R2
Z2
C17
C18
R42
R39
R36
R18
R33
R24
R21
C6
C40
R6
R3
R43
C 660170
04


SR53
SR52
C27
C28
C29
C21
C26
C24
C19
R48
R47
R44
R49
D2
D3
R46
R50
R51
IC5
IC6
IC4
C20
C25
R41
D1
R45
Q1
Q2
C16
C30
C13
C10
C23
IC1
C605105/1
R37
R34
C31
R16
R31
R22
R19
R25
R28
R10
R7
C4
C35
C38
R13
R4
R1
C1
C14
C7
C11
IC2
C22
C2
Z1
R38
R35
C32
R17
R32
R23
R20
R26
R29
R11
R8
R40
C5
C39
R14
R5
R2
C15
C8
C37
Z2
C17
R27
R30
R12
C12
R9
IC3
C18
R42
R39
R36
C33
R18
R33
R24
R21
C9
C6
C40
R15
R6
R3
C3
R43
C605105/1

CIRCUIT DESCRIPTION CONTRAST AND BRIGHTNESS BOARD 9

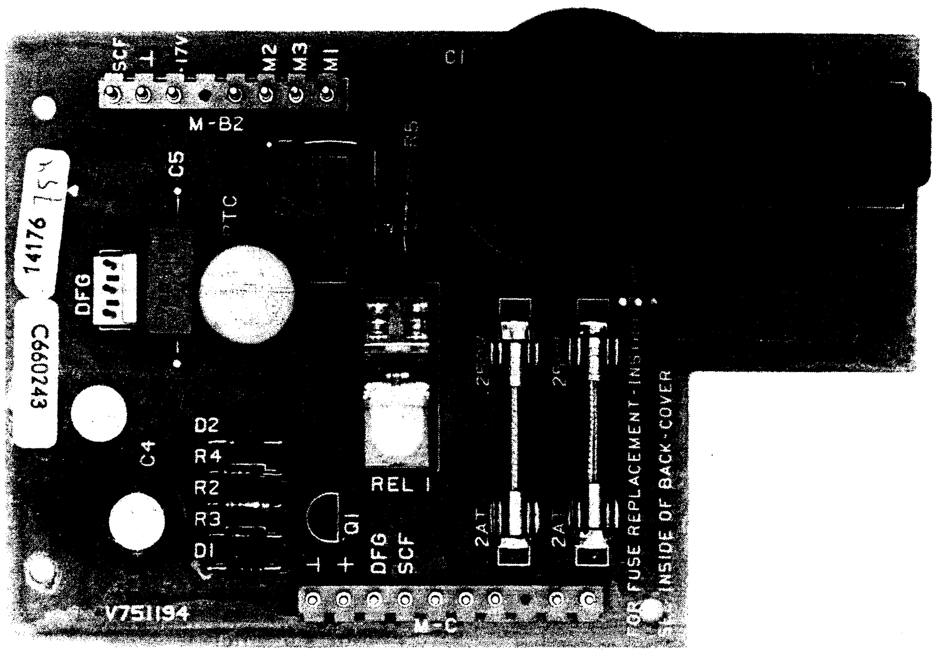
RGB arrive at contact 26, 28, 30 from board 7. The circuit for the three colours is identical so the description is made for red only.

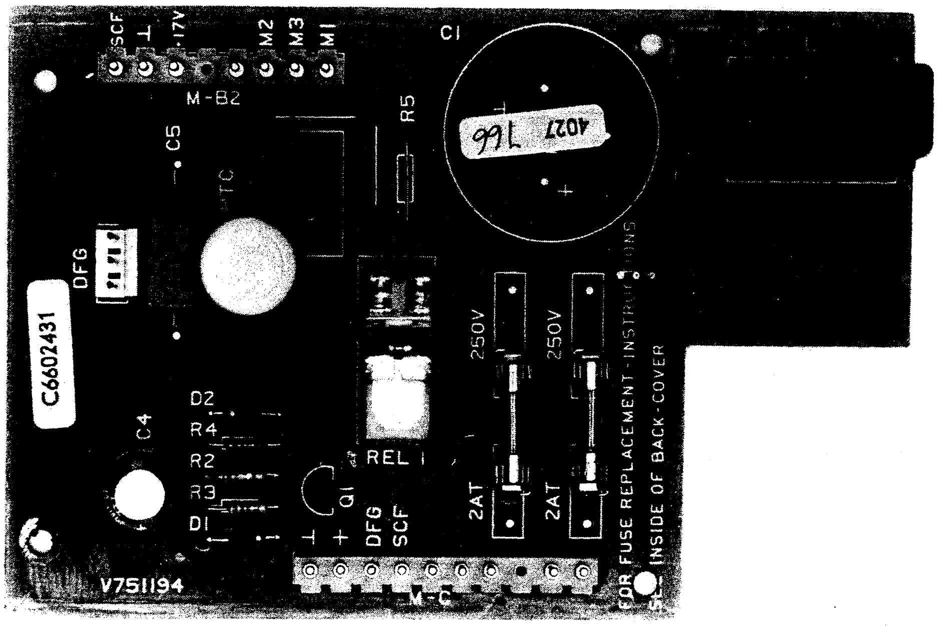
The video signal is applied to pin 6 of IC1 which is the current source of the differential amplifier.
Pin 4 is connected to 6.2 VDC, pin 2 of IC1 is connected to the slider of the contrast control potentiometer. Now by changing the DC input on the base (pin2), the voltage drop across R10 can be adjusted.

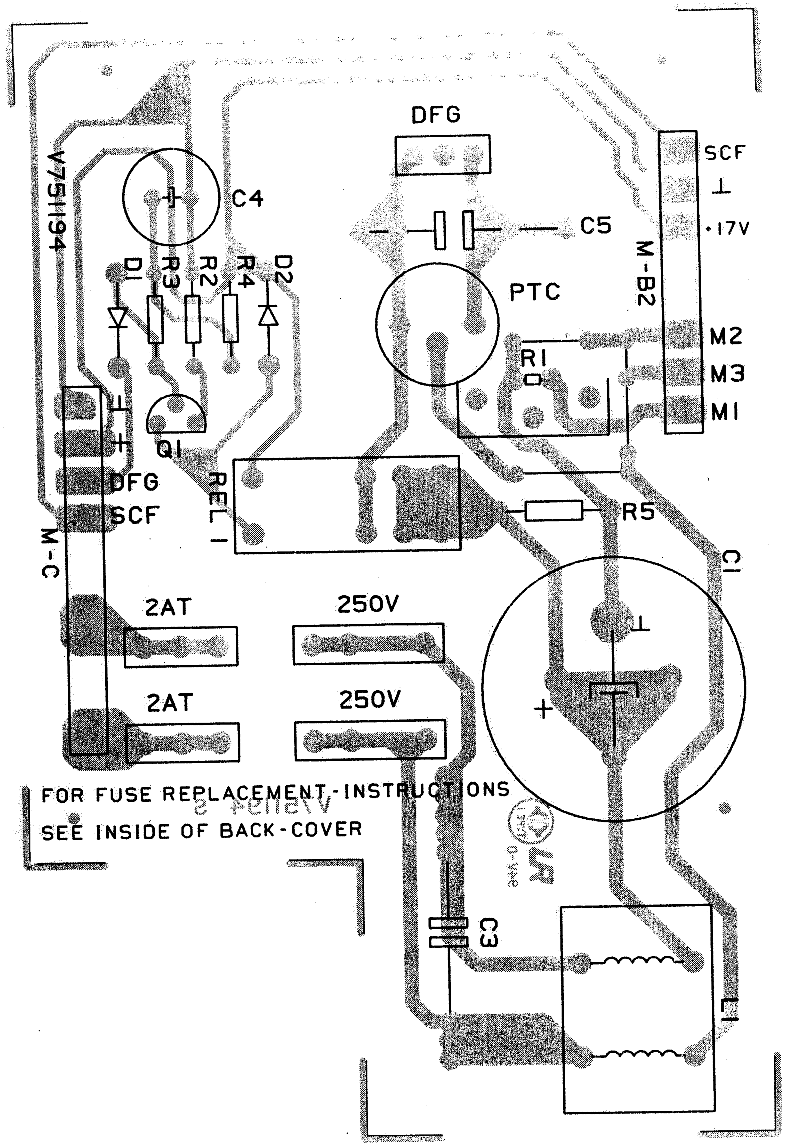
The brightness pulse arrives at contact 24 and is delayed by the two inverters of IC4.
The slider of the brightness potentiometer determines the amplitude of the output pulse at the base of Q1.
After emitter follower Q1, the pulse is added to the video signal of which the contrast has been set.
The combined signal is buffered by IC1 (pin 9,10,11) and leaves the board at contact 8.
The clamping pulse is derived from the brightness pulse at contact 24.
Then the duration of the pulse is determined by the differentiation C29, R45 and the clamp pulse leaves the board at contact 22.

10 **MAINS INPUT 120 Vac** **C660243**

10 **MAINS INPUT 220 Vac** **C6602431**


SCF
⊥
17V
M2
M3
M1
C1
M-B2
R5
C5
PTC
14176
DFG
C660243
C4
D2
R4
R2
R3
D1
Q1
REL 1
⊥
+
DFG
SCF
2AT
2AT
FOR FUSE REPLACEMENT-INSTRUCTIONS
SEE INSIDE OF BACK-COVER
V751194
M-C


SCF
⊥
17V
M2
M3
M1
C1
M-B2
R5
4027 166
+
C5
PTC
DFG
C6602431
C4
D2
R4
R2
R3
D1
Q1
REL 1
250V
250V
⊥
+
DFG
SCF
2AT
2AT
FOR FUSE REPLACEMENT-INSTRUCTIONS
SEE INSIDE OF BACK-COVER
V751194
M-C

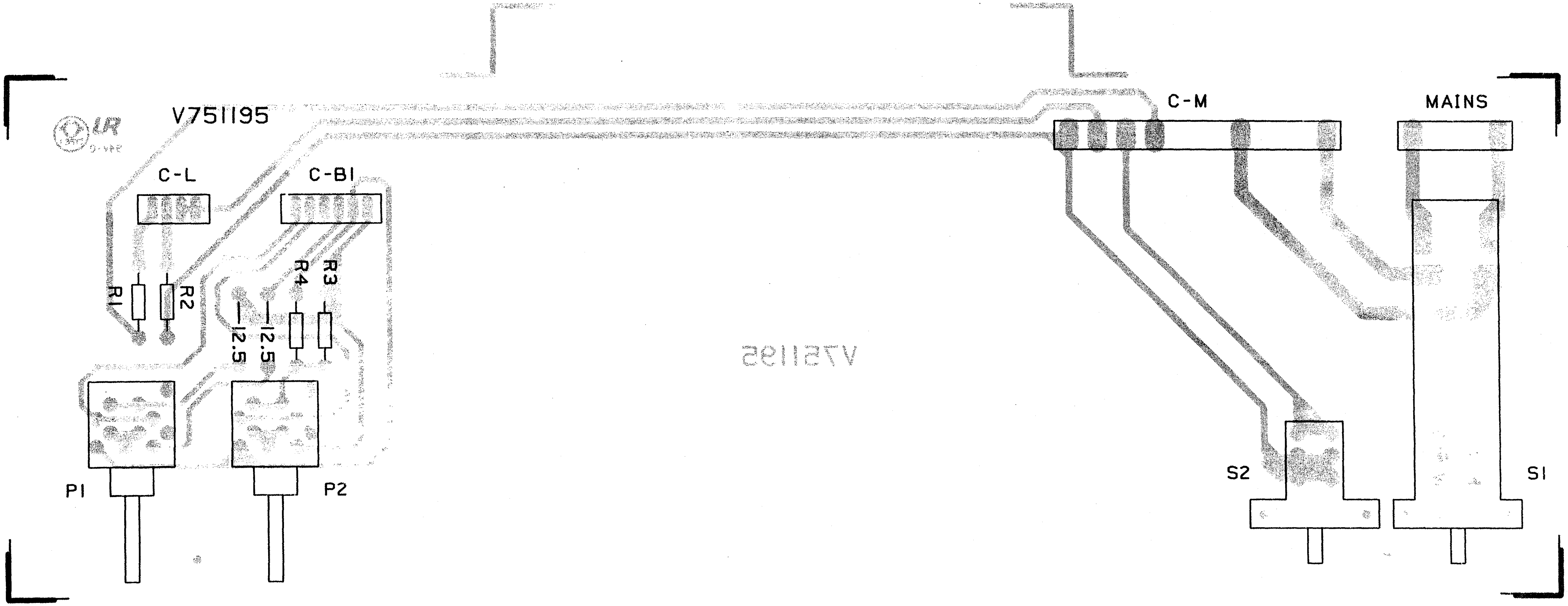

DFG
SCF
⊥
+17V
C5
M-B2
PTC
M2
R1
M3
M1
C4
V751194
D1
R3
R2
R4
D2
Q1
⊥
+
DFG
SCF
REL 1
R5
C1
M-C
2AT
250V
2AT
250V
⊥
+
C3
L1

FOR FUSE REPLACEMENT-INSTRUCTIONS
SEE INSIDE OF BACK-COVER

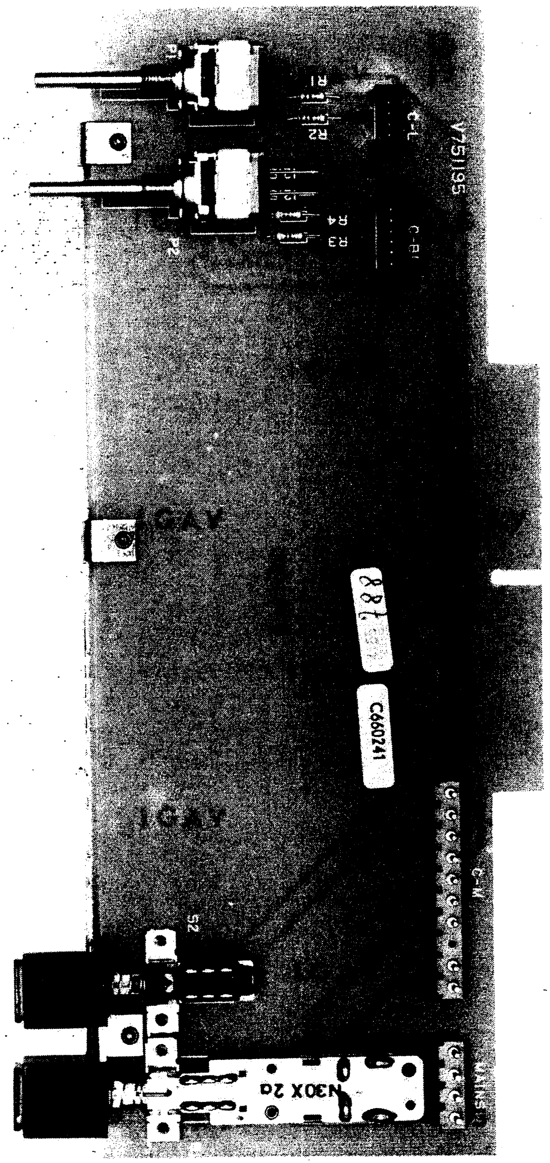
CIRCUIT DESCRIPTION MAINS INPUT BOARD $\boxed{10}$

Via the input switch at the front of the display, the mains voltage arrives at connector CON.M-C.
After the two primary fuses, the mains is filtered by L1.
Via R1 and connector CON.M-B2, mains is connected to the input of the switch mode power supply.
In case of 120 Vac which is a different module, voltage doubling by C1 and R5 is used.

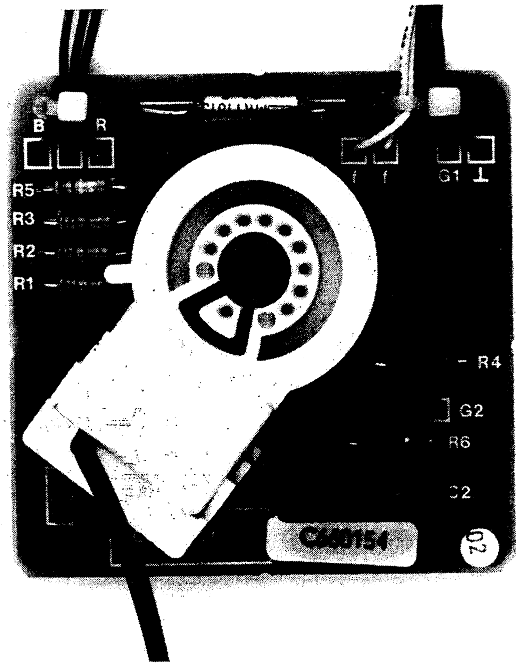
Automatic degaussing by means of PTC1 is obtained when switching on the monitor. Mains is connected via relay 1 which falls off after a certain time determined by the time needed for charging C4.
Manual degaussing is also possible by the manual degaussing on the front panel. When the manual degaussing is pushed, C4 is discharged via D1 and R3. Q1 is blocked and the contact of the relay 1 is closed again, so that the automatic degaussing via PTC1 can work. After a certain time, C4 is charged again so that Q1 gets saturated and the contact of relay 1 opens again.

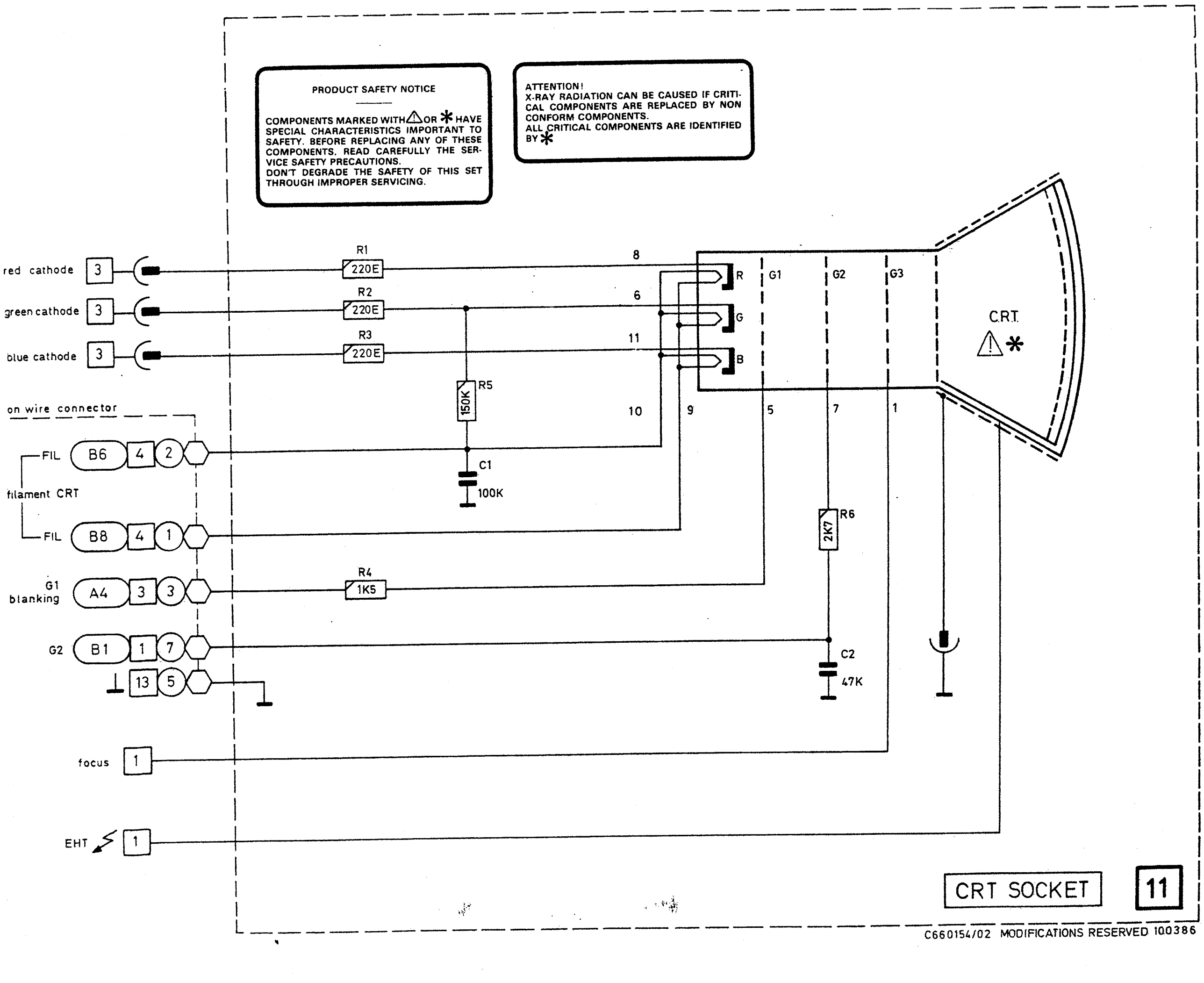

V751195
C-L
C-B1
R1
R2
R4
R3
12.5
12.5
P1
P2
C-M
MAINS
S2
S1

12 CONTROL PANEL C660241


V751195
C660241
N30X 2a

11 CRT SOCKET C660154


B
R
R5
R3
R2
R1
f
f
G1
⊥
R4
G2
R6
C2
C660154
02



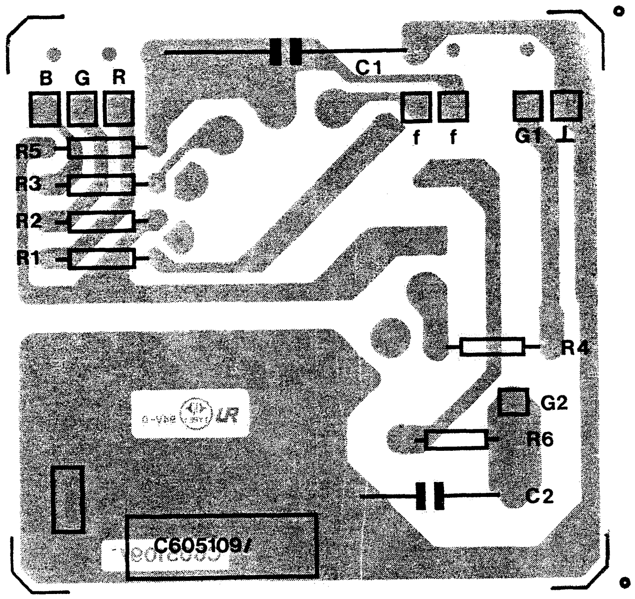
PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS. READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

ATTENTION!
X-RAY RADIATION CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON CONFORM COMPONENTS.
ALL CRITICAL COMPONENTS ARE IDENTIFIED BY ✱

red cathode
3
green cathode
3
blue cathode
3
R1
220E
R2
220E
R3
220E
8
6
11
R
G
B
G1
G2
G3
CRT.
⚠✱
R5
150K
10
9
5
7
1
on wire connector
FIL
B6
4
2
filament CRT
FIL
B8
4
1
C1
100K
R6
2K7
G1
blanking
A4
3
3
R4
1K5
G2
B1
1
7
⊥
13
5
C2
47K
focus
1
EHT
1
CRT SOCKET
11

C660154/02 MODIFICATIONS RESERVED 100386



PARTS LIST OF UNIT 11
CRT SOCKET
Order number of a complete unit: C660154

Order number	Description	Item
C101228	RRCF 220E J 0.50	R1 ,R2 ,R3
C101238	RRCF 1K5 J 0.50	R4
C101241	RRCF 2K7 J 0.50	R6
C101262	RRCF 150K J 0.50	R5
C114602	CPOMEPO 47K M 1000	C2
C114874	CPO AX100K M 630	C1
C311034	TUBPICSOC+SG11-13KV	CRT SOCKET
C3134541	CON MOB .250 P 1	CONNECTOR EARTH
V313462	CON HOUSE RTV P 1	ON WIRE CONNECTOR FOR CATHODE
C3136117	CON HOUSE .156 P 7	ON WIRE CONNECTOR TO MAIN BOARD
C605109	PC CRT SOCKET CD351	PRINTED CIRCUIT BOARD

PRODUCT SAFETY NOTICE

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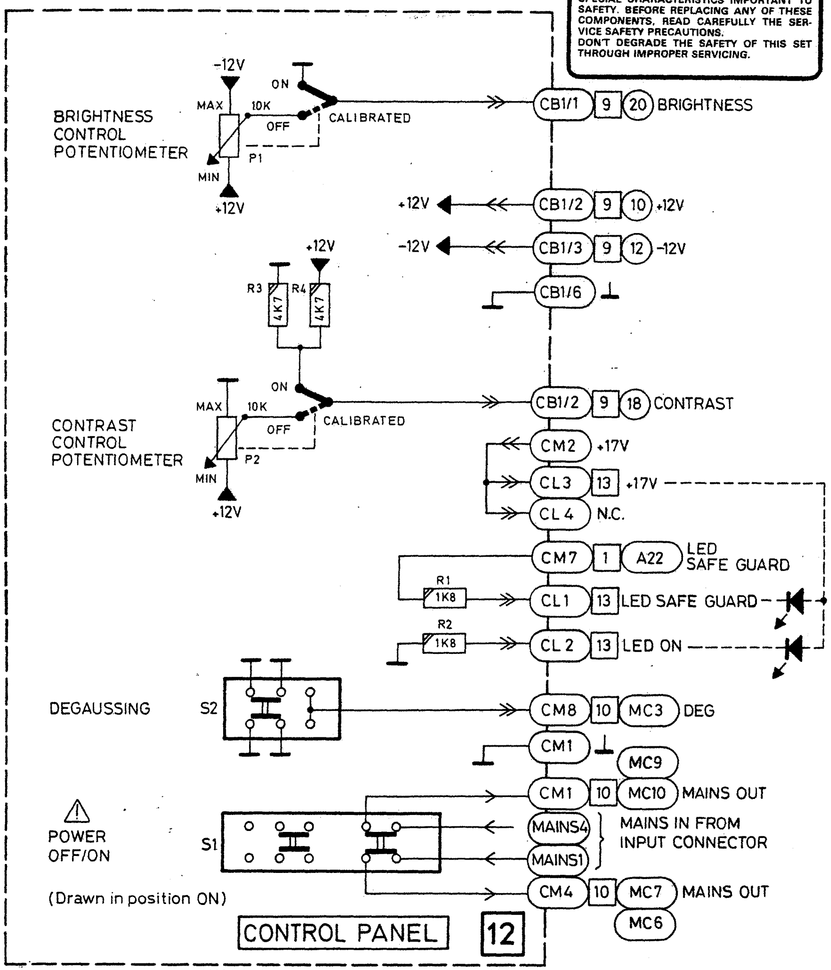
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

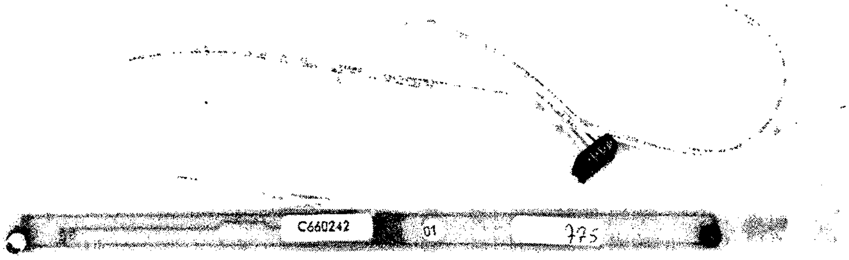

BRIGHTNESS CONTROL POTENTIOMETER
-12V
MAX
10K
ON
OFF
CALIBRATED
P1
MIN
+12V
CB1/1
9
20
BRIGHTNESS
+12V
CB1/2
9
10
+12V
-12V
CB1/3
9
12
-12V
CB1/6
+12V
R3
R4
4K7
4K7
CONTRAST CONTROL POTENTIOMETER
MAX
10K
ON
OFF
CALIBRATED
P2
MIN
+12V
CB1/2
9
18
CONTRAST
CM2
+17V
CL3
13
+17V
CL 4
N.C.
CM7
1
A22
LED SAFE GUARD
R1
1K8
CL1
13
LED SAFE GUARD
R2
1K8
CL 2
13
LED ON
DEGAUSSING
S2
CM8
10
MC3
DEG
CM1
MC9
⚠
POWER OFF/ON
S1
CM1
10
MC10
MAINS OUT
MAINS4
MAINS1
MAINS IN FROM INPUT CONNECTOR
CM4
10
MC7
MAINS OUT
MC6
(Drawn in position ON)
CONTROL PANEL
12

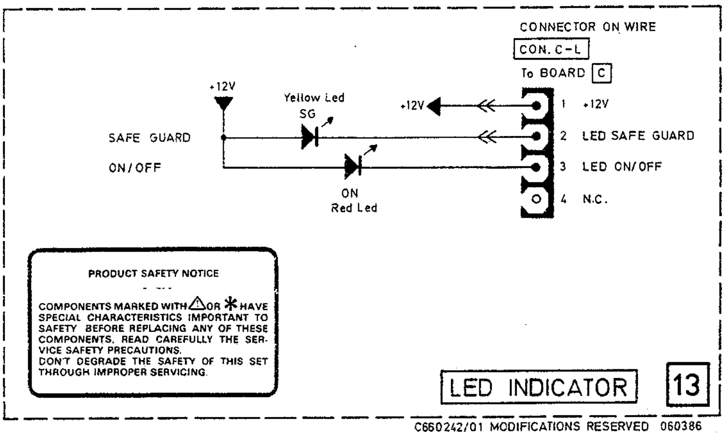
C660241/00 MODIFICATIONS RESERVED 060386

PARTS LIST OF UNIT $\boxed{12}$
CONTROL PANEL
Order number of a complete unit: C660241

Order number	Description	Item
V101239	RRMF 1K8 J 0.50	R1 ,R2
V101244	RRMF 4K7 J 0.50	R3 ,R4
C107250	RPCASS 10K MA0.15	P1 ,P2
V313661	CON MOB TE SV P 4	CON.MAINS
V313662	CON MOB TE SV P10	CON.C-M
V3137040	CON MOB TE MTIS P 4	CON.C-L
V3137060	CON MOB TE MTIS P 6	CON.C-B1
V324780	⚠ SW MAINS N 30X + F2U	S1 (POWER SWITCH WITH DECORATIVE KNOB)
V324794	SWITCH 1C 2XU	S2 (DEGAUSS SWITCH)
C357100	BUTTON FSR BLA-GRE	DECORATIVE KNOB FOR DEGAUSS SWITC
V600370	CONTROL BRACKET 6000	METAL BRACKET
V751195	PCB CONTROL CDCT6151	PRINTED CIRCUIT BOARD

13 LED INDICATOR C660242


C660242
01
775


CONNECTOR ON WIRE
CON. C-L
To BOARD C
+12V
Yellow Led
SG
+12V
1 +12V
2 LED SAFE GUARD
3 LED ON/OFF
4 N.C.
SAFE GUARD
ON/OFF
ON
Red Led
LED INDICATOR
13

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR * HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

C660242/01 MODIFICATIONS RESERVED 060386

PARTS LIST OF UNIT 13
LED INDICATOR
Order number of a complete unit: C660242

Order number	Description	Item
V131650	SMCDIOLED 5MM RED	QTY:1 (ON/OFF)
C131663	SMCDIOLED 5MM YEL	QTY:1 (SAFE GUARD)
V1330145	SMCTRAFIX 5MM TO 18	QTY:2 (LED HOLDER)
V349161	CORD LED UNIT 6351	
V751215	PCB LED UN CDCT6000	PRINTED CIRCUIT BOARD

MANUAL CHANGES
ADDITIONAL INFORMATION

CDCT6151 & CDCT6351
Date : March 16, 1987

These manual pages contain important information for correcting manual errors and for adapting the manual to displays containing improvements made after the printing of the manual.

SECTION I page 1-4, 8. OPTIONS : additional information

An EXTENSION BOARD is available with order number C660194. For maintenance it is advisable to have a pair of these.

SECTION III : additional information
WHITE UNIFORMITY CONTROL

The purpose of a WHITE UNIFORMITY control is to prevent influence of earth magnetism to the picture.

White uniformity is based on driving a dc current in a scan rotation coil, which is mounted around the CRT (next to the degaussing coil).

The control is located on the EHT SUPPLY board 1 inside the display and consists of P2 (WHITE UNIFORMITY) and the switch ON/OFF to switch it on or off.

Setting correct WHITE UNIFORMITY is a part of the installation procedure described in SECTION III and shall be executed by qualified personnel only.
To do so, place the display at the same location and in the same position as he will be used in the future.
Degauss the monitor by means of the degaussing switch on the control panel.
Apply a 100% white field video signal to the display input.
Set the ON/OFF switch on the HORIZONTAL DEFLECTION board to position ON and adjust P2 for a picture on the screen as uniform white as possible.

SECTION V page 5-6 :

All CDCT6151 and CDCT6351 displays with production date 1 may 1986 and later are adjusted for a LOW LIGHTS (CUT OFF) of 0.3 nit on calibrated position with a full black field input signal. The adjustment procedure becomes:

5. WHITE BALANCE

Apply to the red, green and blue input a white window input signal of correct line and field frequency, switchable between 0% (black) and
100% white. Do not forget to terminate the inputs on 75 Ohm.
Install a colour analyser calibrated for the type of phosphors used in this display and for a colour temperature of 9300 K (or use another suitable luminance measurement instrument).

Set contrast and brightness control on the front panel in calibrated position (pushed in).

Apply the white window signal with level 0% (full black).
Turn P7, P8 and P9 (LOW LIGHTS or CUT OFF controls of the red, green and blue video amplifiers) completely to the right (clockwise).
Adjust P5 (VG2 ADJUST) on board 1 (EHT SUPPLY) for a light output of 0.2 nit for the most bright colour on the screen (to be measured with a colour analyser).

Note: 1 nit = 1 candela/square meter = 0.292 foot-Lambert (fL)
1 foot-lambert = 3.43 nit = 3.43 candela/square meter

Adjust P7, P8 and P9 on board 3 (RGB OUT) for 0.3 nit light output for the red, green and blue signals.

Apply the 100% white window video signal.
Adjust P1, P2 and P3 (HIGH LIGHTS or GAIN controls) on board 3 for a light output for the three colours of :

30 nit for a high resolution tube with long persistance.
60 nit for a high resolution tube with standard persistance.

Repeat the adjustments of P7, P8 and P9 again and afterwards these of P1, P2 and P3.
Do not touch the VG2 adjustment.

SECTION VI page 6-13 : added information

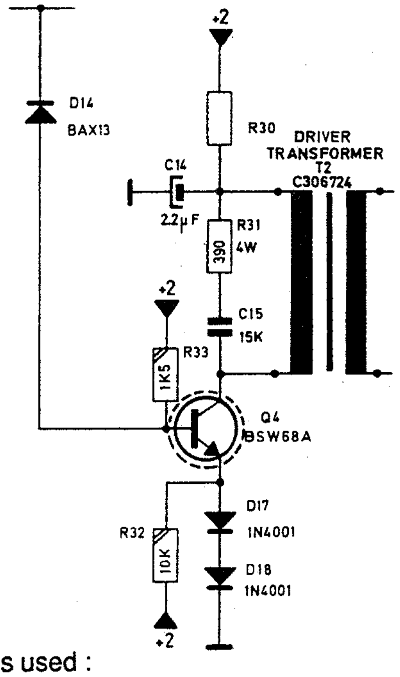
An EXTENSION BOARD is available with order number C660194. For maintenance it is advisable to have a pair of these.

SECTION VII
CHANGES ON THE HORIZONTAL DEFLECTION BOARDS C660259 AND C660239

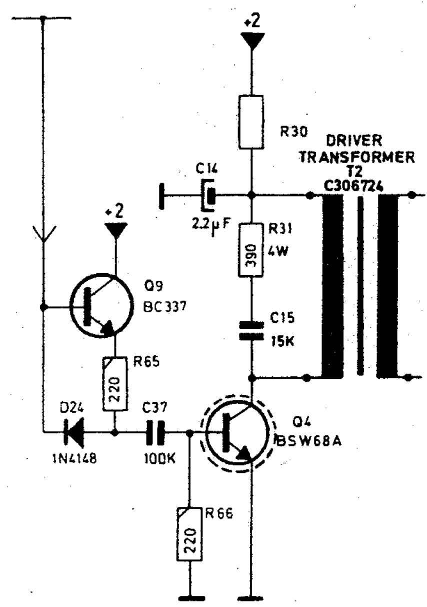
The information given here corresponds to the boards C660259 with index 14 and C660239 with index 13.

In order to avoid oscillation of the overscan limit circuit during adjustments, the line output driver circuit on the HORIZONTAL DEFLECTION board 4 has been modified as shown next :

Before :


+2
D14
BAX13
R30
DRIVER
TRANSFORMER
T2
C306724
C14
2.2μF
R31
390
4W
+2
C15
15K
R33
1K5
Q4
BSW68A
D17
1N4001
R32
10K
D18
1N4001
+2

Now :


+2
R30
DRIVER
TRANSFORMER
T2
C306724
C14
2.2μF
+2
R31
390
4W
Q9
BC337
C15
15K
R65
220
D24
1N4148
C37
100K
Q4
BSW68A
R66
220

New parts used :

V101228	RRMF 220E J 0.50	R65 ,R66
V101242	RRMF 3K3 J 0.50	R46
C114132	CPOMEFF 100K K 250	C37
V1316211	SMCDIO 1N4148	D24
V131426	SMCTRA BC337	Q9

Other changes on these boards C660259 and C660239:

V1011209	RRCFF 47E J 0.30	D22	*instead of*
V1011209	RRCFF 47E J 0.30	SR7	
V101257	RRMF 56K J 0.50	R54	*instead of*
V101259	RRMF 82K J 0.50	R54	
V1114789	CELPR 220M M 25V	C1 ,C5	*instead of*
V111156	CELAX 10M Z 25V	C1 ,C5	
V116310	CPP PR 680P H 160	C21	*instead of*
V1163261	CPP PR 560P H 160	C22	
V1163261	CPP PR 560P H 160	C22	*instead of*
V116310	CPP PR 680P H 160	C21	
C131644	SMCDIOREC 1N4001	D23	*instead of*
V1011209	RRCFF 47E J 0.30	SR8	

On C660259 only :

V101260	RRMF 100K J 0.50	R55	*instead of*
V101261	RRMF 120K J 0.50	R55	

BARCO
13/11/89

MODIFICATIONS ON THE EHT AND THE CRT SOCKET OF CD351 - CDCT6151 - CDCT6351B - CDCT6451

To improve the lowlights stability of the display the Vg2 is stabilized.
Therefore the EHT boards as well as the CRT sockets are modified.
The Vg2 adjustment on the EHT board is omitted (P5, R44, R47, R62) and mounted on the CRT board together with the stabilization circuitry.
Only one diagram, the most complete one, is drawn while the modifications are tabulated in next table for the different units. The new units are printed in bold.

DISPLAY TYPE	EHT ORDER NR/INDEX	P5	R44	R47	R62	R16	T3	C25	CRT SOCKET
CD351/CDCT6151	C6602915/02	2M2	2M7	3M9	10M	6K81	C671006	820pF	C660154
CD351/CDCT6151	**C6602917/03**	**OMITTED**	**OMITTED**	**OMITTED**	**OMITTED**	**6K81**	**C671006**	**820pF**	**C6601542**
CDCT6351/CDCT6351B	C66002935/02	2M2	2M7	3M9	10M	5K6 V101245	V6710069	820pF	C660276
CDCT6351B	**C6602937/03**	**OMITTED**	**OMITTED**	**OMITTED**	**OMITTED**	**5K6** V101245	**V6710069**	**820pF**	**C6602762**
CDCT6451	C6602945/00	2M2	2M7	3M9	10M	4K64 V1026646	V6710069	470pF V1151821	C660276
CDCT6451	**C6602947/03**	**OMITTED**	**OMITTED**	**OMITTED**	**OMITTED**	**4K64** V1026646	**V6710069**	**470pF** V1151821	**C6602762**
OPTION373	**C6602938/00**	**OMITTED**	**OMITTED**	**OMITTED**	**OMITTED**	**5K11** V1026680	**V6710069**	**820pF**	**C6602762**

MODIFICATIONS

SECTION I page 1-4 , 8. OPTIONS : added information

An extension board (order number C660194) is available for maintenance. Boards with two slots need also two extension boards.

SECTION V page 5-6 : correction paragraph 5.

5.Adjust the lowlight, of the red green and blue channel, for 0.3 Nit by calibrated position of the controls and a full black input signal.

Apply to the red, green and blue input a white window input signal switchable between 0% (black) and 100% white. Do not forget to terminate the input signals.Install a colour analyser calibrated for the type of phosphors used in this display and for a colour temperature of 9300 K.

Be sure the brightness and contrast are set in calibrated position.

Switch the signal to its 0% level (full black).
Turn P7, P8 and P9 (low lights of the red, green and blue video amplifiers) completely to the right (clockwise).

Adjust P5 (Vg2 adjust) on board 1 (EHT supply) for a light output of 0.2 Nit for the most bright colour on the screen (to be measured with the colour analyser).

Note :

- 1 Nit = 1 candela/square meter = 0.292 foot-Lambert (ftL)
- 1 foot-Lambert = 3.43 Nit = 3.43 candela/square meter

Switch to 100% white video signal .
Adjust P1, P2 and P3 (high lights or gain controls) on board 3 for a light output, for the three colours, of :

- 30 Nit for a high resolution tube with long persistence.
- 60 Nit for a high resolution tube with standard persistence.

Repeat the adjustment of P7, P8 and P9 - P1, P2 and P3 till the influence between both (high - lowlights) disappears.

PARTS LIST OF THE CRT SOCKET CD351 - CDCT6151

Order number of a complete unit : C6601542

Order number	Description	Item
V1011088	RRCFF 4E7 J 0.30	R8
V101238	RRMF 1K5 J 0.50	R21 ,R7
V101248	RRMF 10K J 0.50	R9
V101255	RRMF 39K J 0.50	R11
V101256	RRMF 47K J 0.50	R10
V101262	RRMF 150K J 0.50	R22
V101272	RRMF 1M J 0.50	R6
V101379	RRMF 3M9 F 1.00	R1 ,R2
V102024	RRCC 100E K 0.50	R18 ,R19 ,R20 ,R23
V102041	RRCC 2K7 K 0.50	R24
V1026007	RRMF 10K F 0.40	R4
V1026466	RRMF 3K01F 0.40	R5
V1026927	RRMF 90K9 F 0.40	R3
V1046515	RRHV 680K F 0.50	R15
V1046565	RRHV 1M2 F 0.50	R13
V104658	RRHV 1M5 J 0.50	R14
V1046605	RRHV 1M8 F 0.50	R16
V1046645	RRHV 2M7 F 0.50	R12
V107513	RMCE V 10K K 0.75	P1
V107567	RMCE PANEL HOLDER	
V1115315	CELPR 10M M5 35	C2
V114084	CPOMEPO 47K K5 63	C1
V114096	CPOMEPO 1M K5 50	C3
C114602	CPOMEPO 47K M 1000	C6
C114874	CPO AX100K M 630	C5
V131624	SMCDIO BAX 18	D1
V132500	SMCTRA MPSA44	T1
V134018	SMCICLVOL TL 431CLP	T2
V134120	SMCICLOPA CA 3140 E	IC1
C311034	TUBPICSOC+SG11-13KV	
C313286	CON MOB TE 2.54 P 3	
V3133925	CON F JUMP 5.08 SN	
C3136117	CON HOUSE .156 P 7	
V315319	CON MOB .250 .8 P 1	
V348000	CABLE TIE B2.5L 98	
V3481054	JUMPER 0.6 15.24 MM	R17
V3481128	JUMPER ISO 33.02 MM	
V3492212	WIRE UNIT C6601541	
V752022	PCB CRTS G2 STAB	

PARTS LIST OF THE CRT SOCKET CDCT6351B - CDCT6451

Order number of a complete unit : C6602762

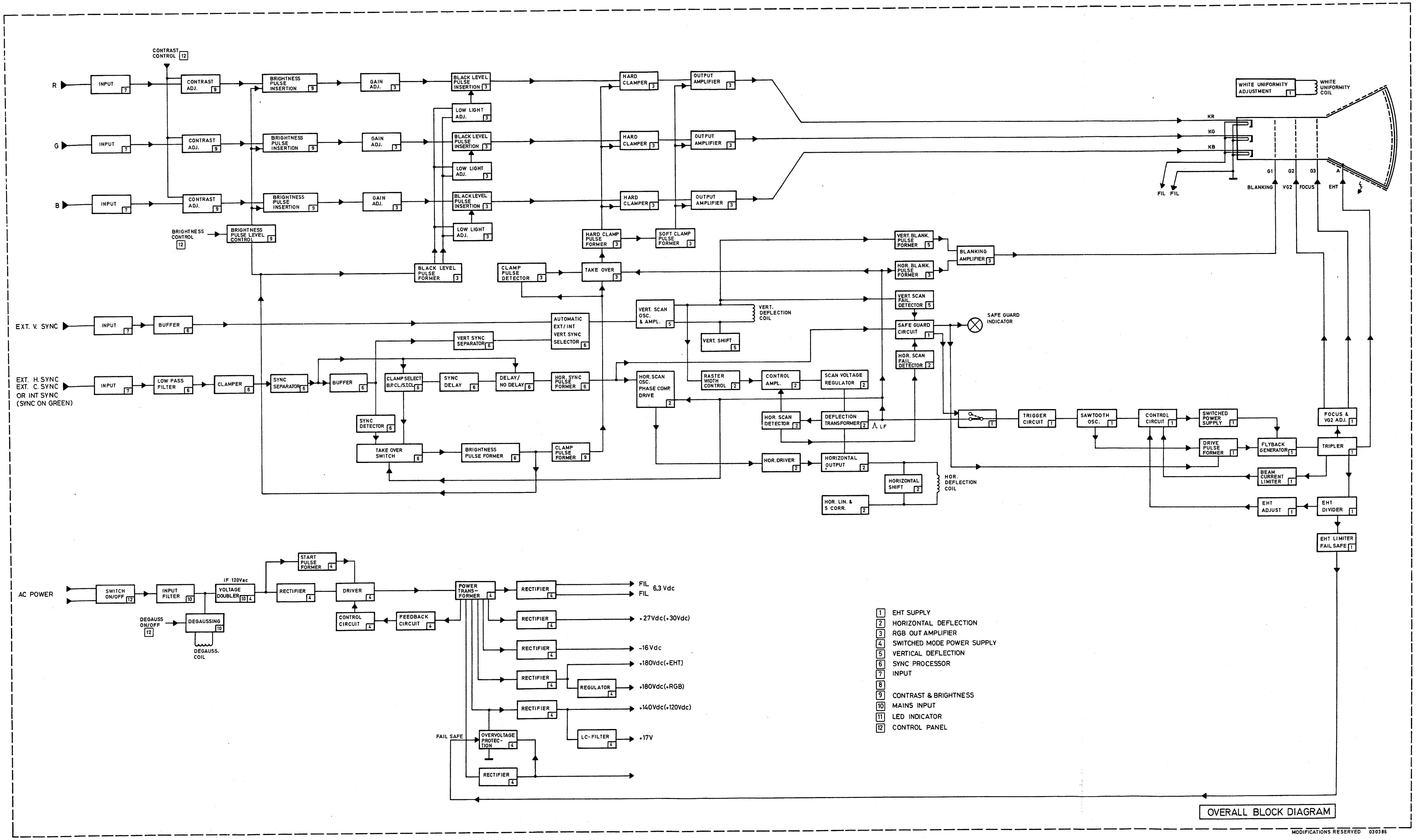
Order number	Description	Item
V1011088	RRCFF 4E7 J 0.30	R8
V101238	RRMF 1K5 J 0.50	R21 ,R7
V101248	RRMF 10K J 0.50	R9
V101255	RRMF 39K J 0.50	R11
V101256	RRMF 47K J 0.50	R10
V101262	RRMF 150K J 0.50	R22
V101272	RRMF 1M J 0.50	R6
V101379	RRMF 3M9 F 1.00	R1 ,R2
V102024	RRCC 100E K 0.50	R18 ,R19 ,R20 ,R23
V102041	RRCC 2K7 K 0.50	R24
V1026007	RRMF 10K F 0.40	R4
V1026466	RRMF 3K01F 0.40	R5
V1026927	RRMF 90K9 F 0.40	R3
V1046515	RRHV 680K F 0.50	R15
V1046565	RRHV 1M2 F 0.50	R13
V104658	RRHV 1M5 J 0.50	R14
V1046605	RRHV 1M8 F 0.50	R16
V1046645	RRHV 2M7 F 0.50	R12
V107513	RMCE V 10K K 0.75	P1
V107567	RMCE PANEL HOLDER	
V1115315	CELPR 10M M5 35	C2
V114084	CPOMEPO 47K K5 63	C1
V114096	CPOMEPO 1M K5 50	C3
C114602	CPOMEPO 47K M 1000	C6
C114874	CPO AX100K M 630	C5
V131624	SMCDIO BAX 18	D1
V132500	SMCTRA MPSA44	T1
V134018	SMCICLVOL TL 431CLP	T2
V134120	SMCICLOPA CA 3140 E	IC1
C311034	TUBPICSOC+SG11-13KV	
C313286	CON MOB TE 2.54 P 3	
V3133925	CON F JUMP 5.08 SN	
C3136117	CON HOUSE .156 P 7	
V315319	CON MOB .250 .8 P 1	
V348000	CABLE TIE B2.5L 98	
V3481054	JUMPER 0.6 15.24 MM	R17
V3481128	JUMPER ISO 33.02 MM	
V3492211	WIRE UNIT C6602761	
V752022	PCB CRTS G2 STAB	

PARTS LIST OF THE EHT

Order number of a complete unit : C6602915

Order number	Description	Item
C1011129 ⚠	RRCFF 10E J 0.30	R39 ,R40
V1011249 ⚠	RRCFF 100E J 0.30	R58
V101220	RRMF 47E J 0.50	R33
V101223	RRMF 82E J 0.50	R41 ,R42
V101224	RRMF 100E J 0.50	R26 ,R46 ,R49 ,R51
V101232	RRMF 470E J 0.50	R55 ,R66
C1012359 ⚠	RRCFF 820E J 0.50	R45
V101236	RRMF 1K J 0.50	R25 ,R52 ,R68
V101239	RRMF 1K8 J 0.50	R29
V101240	RRMF 2K2 J 0.50	R12
V101244	RRMF 4K7 J 0.50	R14
V101247	RRMF 8K2 J 0.50	R11
V101248	RRMF 10K J 0.50	R18 ,R19 ,R20 ,R21 ,R3 ,R43 , R50 ,R57 ,R8 ,R9
V101250	RRMF 15K J 0.50	R64
V101251	RRMF 18K J 0.50	R35
V101252	RRMF 22K J 0.50	R34
V101254	RRMF 33K J 0.50	R22
V101256	RRMF 47K J 0.50	R1 ,R10 ,R13 ,R2 ,R4 ,R67 , R69
V101259	RRMF 82K J 0.50	R15
V101260	RRMF 100K J 0.50	R24 ,R37 ,R53
V101261	RRMF 120K J 0.50	R27 ,R5
V101264	RRMF 220K J 0.50	R36
V101266	RRMF 330K J 0.50	R17 ,R6
V101268	RRMF 470K J 0.50	R7
V101272	RRMF 1M J 0.50	R28
V101276	RRMF 2M2 J 0.50	R65
V102334	RRMF 680E J 2.50	R30
V1026297	RRMF 20K F 0.40	R23
V1026806	RRMF 6K81F 0.40	R16
V102919	RRMF 39E J 1.60	R38 ,R70
V103622	RRWW H 6E8 K 4.00	R32
V103634	RRWW H 68E K 4.00	R31
C1046621	RRHV 2M2 J 1.00	R48
V104664	RRHV 2M7 J 0.50	R44
C104670	RRHV 3M9 J 0.50	R47
V104678	RRHV 10M J 0.50	R62
V106517	RTWW KH 1K K 3.00	P2
V106829	RTCEM V 10K K 0.50	P1
V106833	RTCEM V100K K 0.50	P3 ,P6
V1072535	RTCAS V 2M2 M 0.40	P5
V107612	RPFOC 28M K	P4
C1111961	CELAX 1M M 100	C4
V111477	CELPR 100M M5 25	C23 ,C32
V111485	CELPR 100M M7 200	C21
V1115105	CELPR 22M M5 25	C19
V1115115	CELPR 47M M5 25	C15 ,C16
V1115465	CELPR 1M M5 50	C8
C111760	CPPMEPO 1K J 2000	C14
V1127830	CX7R MI100K K5 50	C22 ,C27 ,C7 ,C9
V114024	CPOMEPO 3K3 K 250	C20
V114032	CPOMEPO 15K K 250	C12
V1140422	CPOMEPO100K K 100	C11 ,C29
V1140542	CPOMEPO 1M J 100	C31
V114080	CPOMEPO 10K K5 63	C26

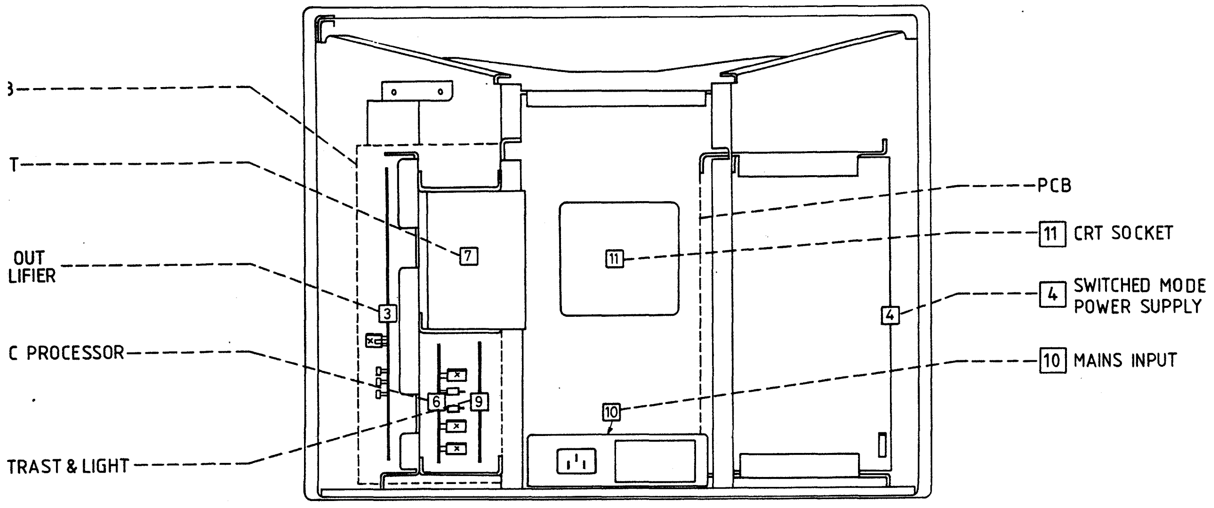
Order number	Description	Item
V114081	CPOMEPO 15K K5 63	C2 ,C24 ,C28
V114094	CPOMEP0680K M5 50	C30
V114481	CPO PO 1K5 M5 100	C10
V114482	CPO P0 2K2 M5 100	C13 ,C3
V114483	CPO PO 3K3 M5 100	C1
V1145961	CPPMEP0910K K 250	C17
C114636	CPPMEPO 47K M 1600	C18
V115124	CPOMEPO 1K5 M 400	C6
V115185	CPC PO820P K5 100	C25
V116315	CPP PR 4K7 H 160	C5
V1314073	SMCTRA BC 547 C	Q1 ,Q3 ,Q7
V1314133	SMCTRA BC 557 C	Q2
V131426	SMCTRA BC 337	Q4
V1316211	SMCDIO 1N4148	D10 ,D2 ,D3 ,D4
V131624	SMCDIO BAX 18	D11
V131637	SMCDIO BA 158	D7 ,D8
C131782	SMCDIOZEN 1.3W C5V1	D6
V131917	SMCDIOREC BY 228	D5
V132194	SMCICLOPA TL 072	IC3
V132501	SMCTRA BC 327-25	Q8
V1325171	SMCTRAPOW BUX 84 F	Q9
C132562	SMCTRA BC 639	Q5
C132574	SMCTRAPOW BU 508 A	Q6
C133054	SMCTRA CLIP SOT93	
C133055	SMCTRA ISO PL SOT93	Q6
V134005	SMCICLVOL LM 339	IC2
C137296	SMCICL TL 494	IC1
C306724	TRF DRIVER AT4043/ 59	T1
C313590	CON MOB SE AU C P32	
V315331	SOLDERLUG1 D3.2 L12	
V324152	SW SLIDE SE DPDT	S1 ,S2
V3400100	WIRE 0.6 MM L 30MM	
V342168	WIRE AWG24 UL1007 W	
V342182	WIRE AWG22 UL1015 R	W20
V3481024	JUMPER 0.6 7.62 MM	W10 ,W21
V3481034	JUMPER 0.6 10.16 MM	W19 ,W2 ,W4 ,W5 ,W6
V3481044	JUMPER 0.6 12.70 MM	W15 ,W16 ,W7
V3481054	JUMPER 0.6 15.24 MM	W11 ,W13
V3481064	JUMPER 0.6 17.78 MM	W3 ,W8
V3481084	JUMPER 0.6 22.86 MM	W14
V3481178	JUMPER ISO 45.72 MM	W1
V362121	SMP+M M3 X 6 D7985	
V362123	SMP+M M3 X10 D7985	
V363601	SMP+C 2.9X 6.5D7981	
V366102	NMH M M3 D 934	
V367401	RIV. AL D2.4 L 9.1	
V367502	WASHER LA 3.2 D6798	
V6001931	HEATSINK EHT CDCT60	
C660308	UN EHT TRIPLER 63/64	D9
V6710051	CHOKE 3.6MH	L1
C671006	EHT TRANSFORMER	T3
V752006	PCB EHT V 2	
C773028	CHOKE RA NS 220 UH	L2


CONTRAST CONTROL 12
R
G
B
INPUT 7
CONTRAST ADJ. 9
BRIGHTNESS PULSE INSERTION 9
GAIN ADJ. 3
BLACK LEVEL PULSE INSERTION 3
LOW LIGHT ADJ. 3
HARD CLAMPER 3
OUTPUT AMPLIFIER 3
BRIGHTNESS CONTROL 12
BRIGHTNESS PULSE LEVEL CONTROL 9
BLACK LEVEL PULSE FORMER 3
HARD CLAMP PULSE FORMER 3
SOFT CLAMP PULSE FORMER 3
CLAMP PULSE DETECTOR 3
TAKE OVER 3
WHITE UNIFORMITY ADJUSTMENT 1
WHITE UNIFORMITY COIL
KR
KG
KB
FIL
FIL
G1
G2
G3
A
BLANKING
VG2
FOCUS
EHT
VERT. BLANK. PULSE FORMER 5
HOR. BLANK. PULSE FORMER 3
BLANKING AMPLIFIER 3
VERT. SCAN FAIL. DETECTOR 5
SAFE GUARD CIRCUIT 1
SAFE GUARD INDICATOR
HOR. SCAN FAIL. DETECTOR 2
EXT. V. SYNC
BUFFER 6
AUTOMATIC EXT/INT VERT. SYNC SELECTOR 6
VERT. SCAN OSC. & AMPL. 5
VERT. DEFLECTION COIL
VERT. SHIFT 5
VERT SYNC SEPARATOR 6
EXT. H. SYNC
EXT. C. SYNC
OR INT SYNC
(SYNC ON GREEN)
LOW PASS FILTER 6
CLAMPER 6
SYNC SEPARATOR 6
BUFFER 6
CLAMP SELECT B.P.CL/S.T.CL 6
SYNC DELAY 6
DELAY/ NO DELAY 6
HOR. SYNC PULSE FORMER 6
HOR. SCAN OSC. PHASE COMP. DRIVE 2
RASTER WIDTH CONTROL 2
CONTROL AMPL. 2
SCAN VOLTAGE REGULATOR 2
SYNC DETECTOR 6
TAKE OVER SWITCH 6
BRIGHTNESS PULSE FORMER 6
CLAMP PULSE FORMER 9
HOR. SCAN DETECTOR 2
DEFLECTION TRANSFORMER 2
Λ LF
HOR. DRIVER 2
HORIZONTAL OUTPUT 2
HORIZONTAL SHIFT 2
HOR. DEFLECTION COIL
HOR. LIN. & S CORR. 2
1
TRIGGER CIRCUIT 1
SAWTOOTH OSC. 1
CONTROL CIRCUIT 1
SWITCHED POWER SUPPLY 1
DRIVE PULSE FORMER 1
FLYBACK GENERATOR 1
TRIPLER 1
FOCUS & VG2 ADJ. 1
BEAM CURRENT LIMITER 1
EHT ADJUST 1
EHT DIVIDER 1
EHT LIMITER FAIL SAFE 1
AC POWER
SWITCH ON/OFF 12
INPUT FILTER 10
IF 120Vac
VOLTAGE DOUBLER 10 4
DEGAUSS ON/OFF 12
DEGAUSSING 10
DEGAUSS. COIL
RECTIFIER 4
START PULSE FORMER 4
DRIVER 4
CONTROL CIRCUIT 4
FEEDBACK CIRCUIT 4
POWER TRANS-FORMER 4
RECTIFIER 4
FIL
FIL
6,3 Vdc
+27Vdc(+30Vdc)
-16Vdc
+180Vdc(+EHT)
REGULATOR 4
+180Vdc(+RGB)
+140Vdc(+120Vdc)
LC-FILTER 4
+17V
FAIL SAFE
OVERVOLTAGE PROTEC-TION 4
1 EHT SUPPLY
2 HORIZONTAL DEFLECTION
3 RGB OUT AMPLIFIER
4 SWITCHED MODE POWER SUPPLY
5 VERTICAL DEFLECTION
6 SYNC PROCESSOR
7 INPUT
8
9 CONTRAST & BRIGHTNESS
10 MAINS INPUT
11 LED INDICATOR
12 CONTROL PANEL

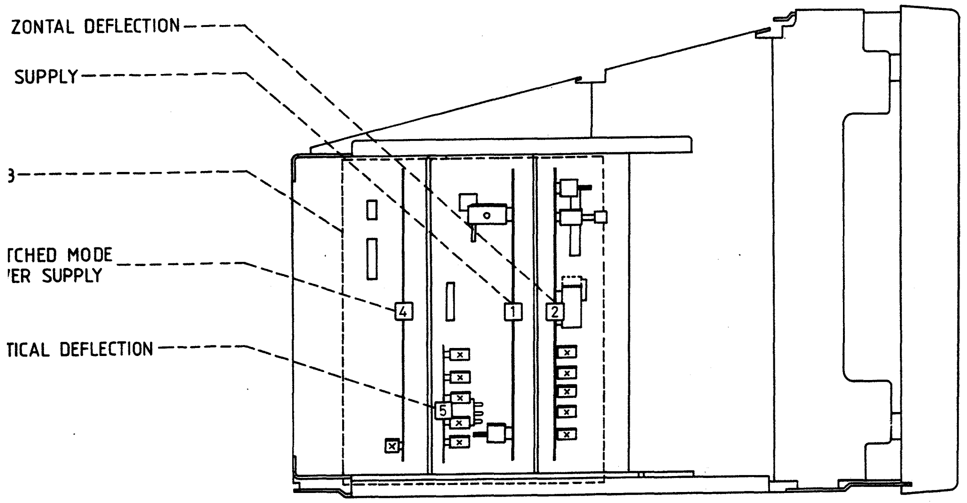
OVERALL BLOCK DIAGRAM

MODIFICATIONS RESERVED 030386

BOARD LOCATION

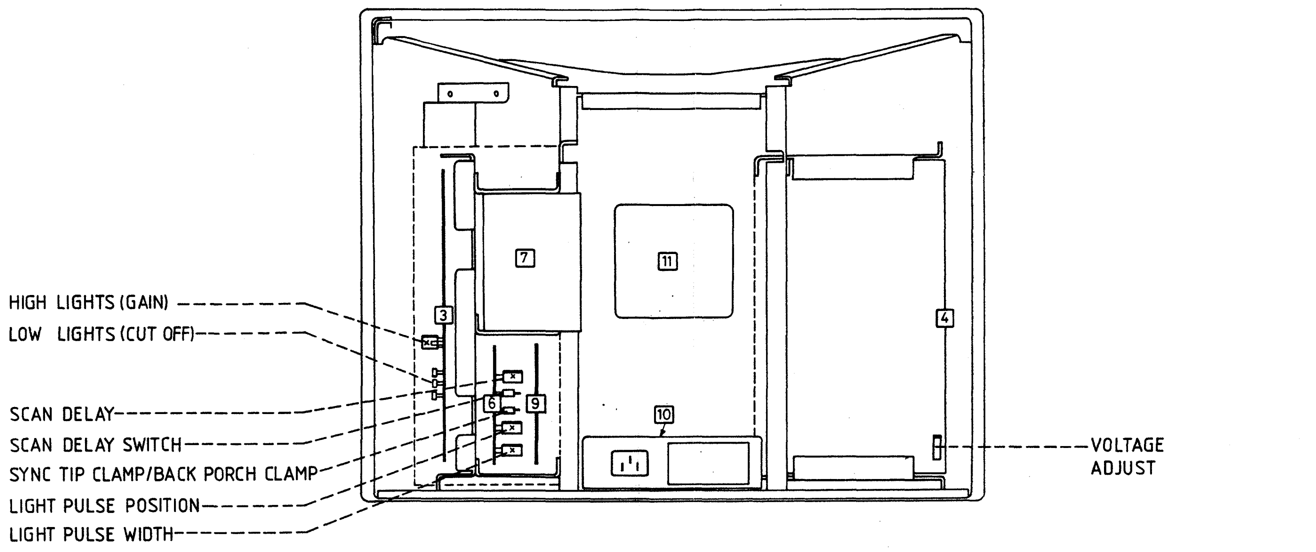


3
T
OUT
LIFIER
C PROCESSOR
TRAST & LIGHT
PCB
11 CRT SOCKET
4 SWITCHED MODE POWER SUPPLY
10 MAINS INPUT
7
3
6
9
11
10
4

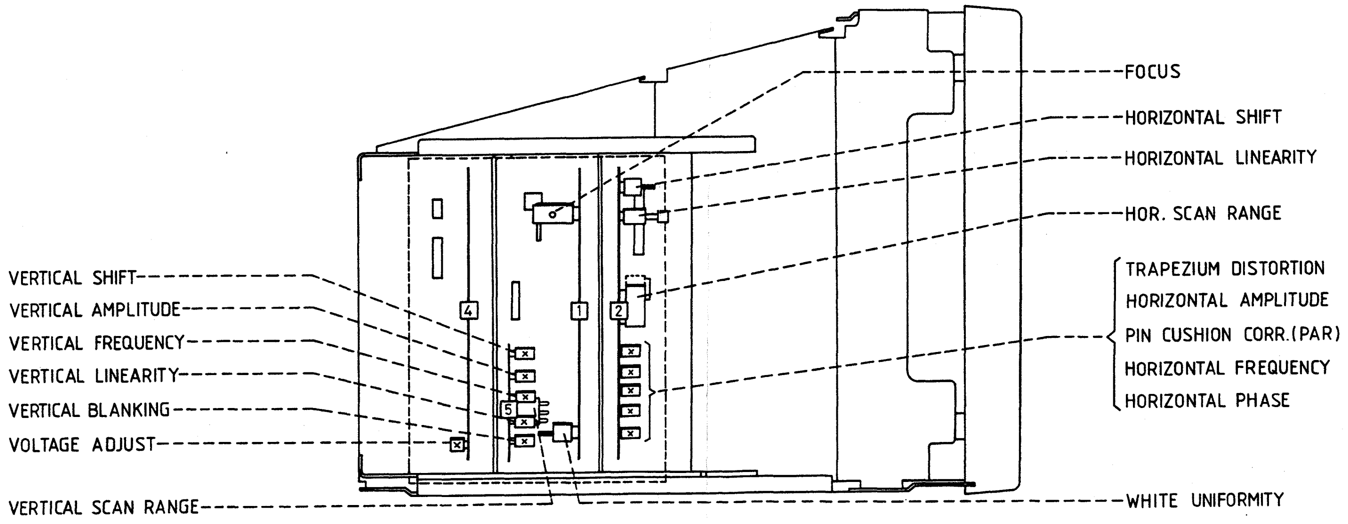


ZONTAL DEFLECTION
SUPPLY
3
TCHED MODE
'ER SUPPLY
TICAL DEFLECTION
4
1
2
5

SECOND ORDER CONTROLS

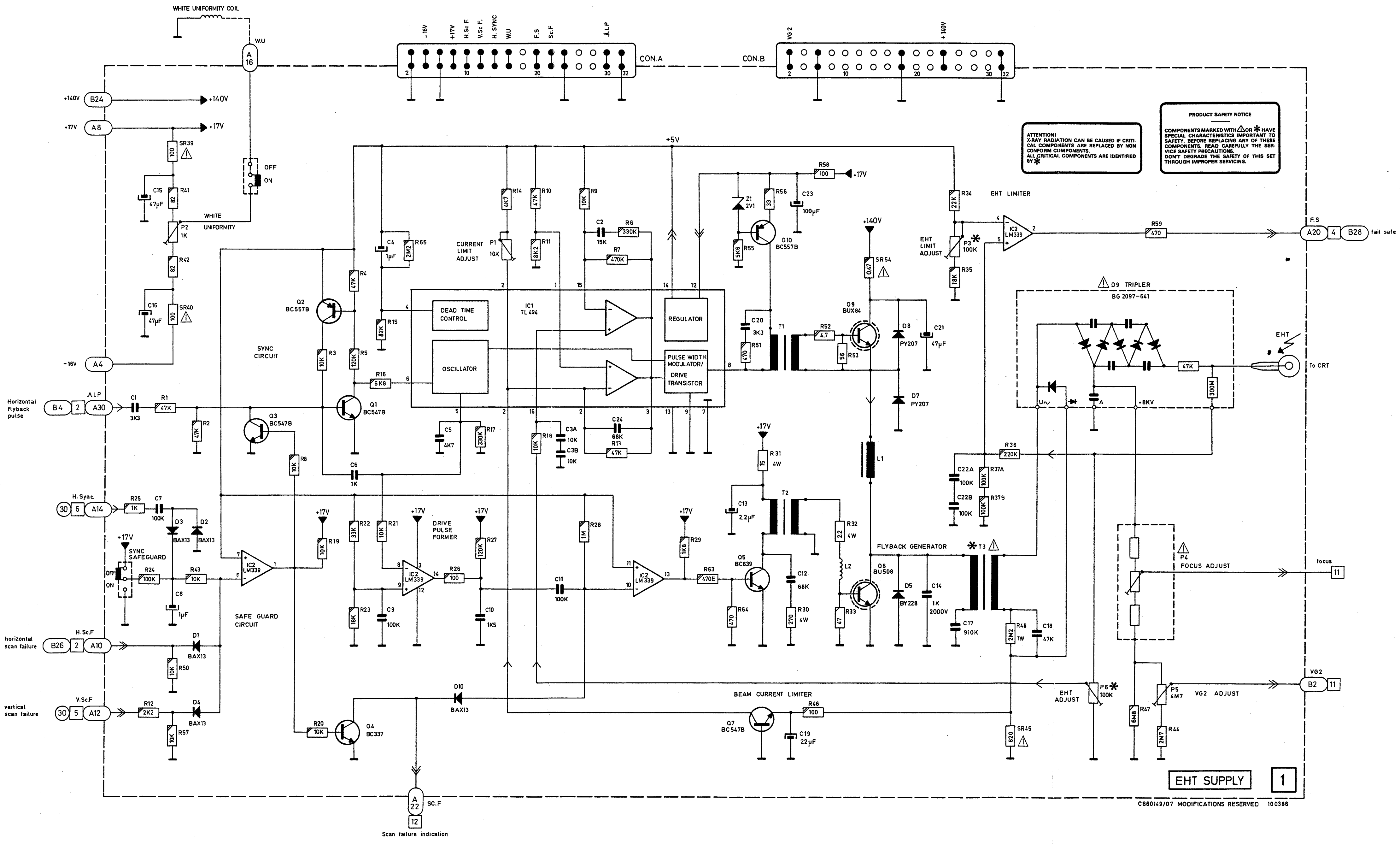


HIGH LIGHTS (GAIN)
LOW LIGHTS (CUT OFF)
SCAN DELAY
SCAN DELAY SWITCH
SYNC TIP CLAMP/BACK PORCH CLAMP
LIGHT PULSE POSITION
LIGHT PULSE WIDTH
VOLTAGE
ADJUST
7
11
3
6
9
10
4



FOCUS
HORIZONTAL SHIFT
HORIZONTAL LINEARITY
HOR. SCAN RANGE
TRAPEZIUM DISTORTION
HORIZONTAL AMPLITUDE
PIN CUSHION CORR. (PAR)
HORIZONTAL FREQUENCY
HORIZONTAL PHASE
VERTICAL SHIFT
VERTICAL AMPLITUDE
VERTICAL FREQUENCY
VERTICAL LINEARITY
VERTICAL BLANKING
VOLTAGE ADJUST
VERTICAL SCAN RANGE
WHITE UNIFORMITY
4
1
2
5

R	25. 24.12.39.41.42.40.1.50.57. 2.43. 8 3.19.20. 4,5.22.23 15.16.21, 65 26 17.27. / 14 10.11.18. 9.28. 7.13. 6. 29 63 64.55.51 31, 56.30 46 58.52, 53.32.33. 54 34.35. 37A.37B 36 48.45 38 47 59 44
C	1. 15.16. 7 8 6 9 . 4 5 10 3A 3B 11 24 20.13 12.23.19 21 14 22A.22B.17, 18
MISC.	P1.D3. D2.D1.D4. Q3 IC2 Q2 Q1 Q4 D10 P2 IC1 Z1 Q7 Q10, Q5 T1,T2, Q9 L1 Q6 D8,D7,D5 P3 T3 P6 D9 P5 P4


WHITE UNIFORMITY COIL
W.U
A 16
CON. A
CON. B
–16V
+17V
H.Sc F.
V.Sc F.
H. SYNC
W.U
F.S
Sc.F
ΛLP
VG 2
+140V
+140V
B24
+17V
A8
SR39
C15 47µF
R41 82
P2 1K
WHITE UNIFORMITY
OFF
ON
R42 82
C16 47µF
SR40 100
–16V
A4
Horizontal flyback pulse
B4 2 A30
ΛLP
C1 3K3
R1 47K
R2 47K
+5V
C4 1µF
R65 2M2
Q2 BC557B
SYNC CIRCUIT
R4 47K
R3 10K
R5 120K
R15 82K
R16 6K8
Q1 BC547B
Q3 BC547B
R8 10K
C6 1K
CURRENT LIMIT ADJUST
P1 10K
R14 4K7
R10 47K
R11 8K2
R9 10K
C2 15K
R6 330K
R7 470K
IC1 TL 494
DEAD TIME CONTROL
OSCILLATOR
REGULATOR
PULSE WIDTH MODULATOR/ DRIVE TRANSISTOR
C5 4K7
R17 330K
R18 10K
C3A 10K
C3B 10K
C24 68K
R13 47K
R58 100
+17V
Z1 2V1
R56 33
C23 100µF
R55 5K6
Q10 BC557B
C20 3K3
R51 470
T1
R52 4.7
R53 56
Q9 BUX84
SR54 0.47
D8 PY207
C21 47µF
D7 PY207
L1
R34 22K
EHT LIMITER
EHT LIMIT ADJUST
P3 100K
R35 18K
IC2 LM339
R59 470
F.S
A20 4 B28 fail safe
D9 TRIPLER
BG 2097–641
EHT
To CRT
47K
300M
+8KV
R36 220K
C22A 100K
R37A 100K
C22B 100K
R37B 100K
H.Sync
30 6 A14
R25 1K
C7 100K
D3 BAX13
D2 BAX13
SYNC SAFEGUARD
OFF
ON
R24 100K
R43 10K
C8 1µF
IC2 LM339
SAFE GUARD CIRCUIT
R19 10K
R22 33K
R21 10K
DRIVE PULSE FORMER
R27 120K
R26 100
C9 100K
R23 18K
C10 1K5
R28 1M
C11 100K
R29 1K8
R63 470E
IC2 LM339
R31 15 4W
T2
C13 2.2µF
R32 22 4W
L2
Q5 BC639
C12 68K
R64 470
R30 270 4W
R33 47
Q6 BU508
FLYBACK GENERATOR
T3
D5 BY228
C14 1K 2000V
C17 910K
R48 2M2 1W
C18 47K
P4 FOCUS ADJUST
focus
11
horizontal scan failure
B26 2 A10
H.Sc.F
D1 BAX13
R50 10K
vertical scan failure
30 5 A12
V.Sc.F
R12 2K2
D4 BAX13
R57 10K
D10 BAX13
R20 10K
Q4 BC337
BEAM CURRENT LIMITER
Q7 BC547B
R46 100
C19 22µF
SR45 820
EHT ADJUST
P6 100K
R47 6M8
P5 4M7
VG2 ADJUST
R44 2M7
VG2
B2 11
A 22 SC.F
12
Scan failure indication

ATTENTION!
X-RAY RADIATION CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON CONFORM COMPONENTS.
ALL CRITICAL COMPONENTS ARE IDENTIFIED BY *

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR * HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

EHT SUPPLY 1

C660149/07 MODIFICATIONS RESERVED 100386

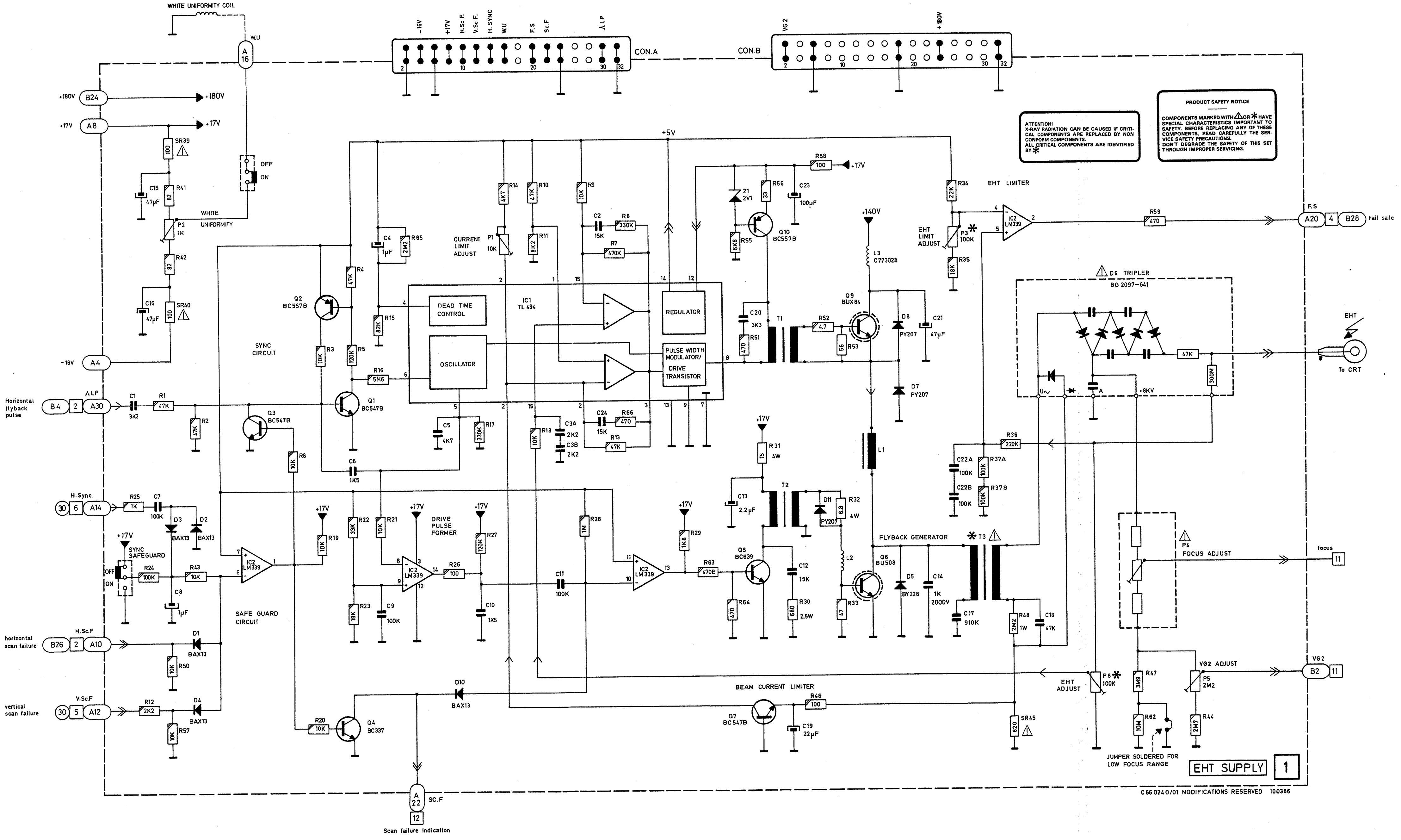
PARTS LIST OF UNIT 1
EHT SUPPLY

Order number of a complete unit: C660149

Order number	Description	Item
C101108	RRCF 4E7 J 0.25	R52
C101118	RRCF 33E J 0.25	R56
C101121	RRCF 56E J 0.25	R53
C101123	RRCF 82E J 0.25	R41 ,R42
C101124	RRCF 100E J 0.25	R26 ,R46
V1011249 ⚠	RRCFF 100E J 0.30	R39 ,R40 ,R58
C101132	RRCF 470E J 0.25	R51 ,R59 ,R63 ,R64
C101136	RRCF 1K J 0.25	R25
C101139	RRCF 1K8 J 0.25	R29
C101140	RRCF 2K2 J 0.25	R12
C101144	RRCF 4K7 J 0.25	R14
C101145	RRCF 5K6 J 0.25	R55
C101146	RRCF 6K8 J 0.25	R16
C101147	RRCF 8K2 J 0.25	R11
C101148	RRCF 10K J 0.25	R18 ,R19 ,R20 ,R21 ,R3 ,R43 ,R50 R57 ,R8 ,R9
C101151	RRCF 18K J 0.25	R23 ,R35
C101152	RRCF 22K J 0.25	R34
C101154	RRCF 33K J 0.25	R22
C101156	RRCF 47K J 0.25	R1 ,R10 ,R13 ,R2 ,R4
C101159	RRCF 82K J 0.25	R15
C101160	RRCF 100K J 0.25	R'37,R24 ,R37
C101161	RRCF 120K J 0.25	R27 ,R5
C101164	RRCF 220K J 0.25	R36
C101166	RRCF 330K J 0.25	R17 ,R6
C101168	RRCF 470K J 0.25	R7
C101172	RRCF 1M J 0.25	R28
C101176	RRCF 2M2 K 0.25	R65
C101220	RRCF 47E J 0.50	R33
C1012359 ⚠	RRCFF 820E J 0.50	R45
V1012918 ⚠	RRCFF E47K 0.50	SR54
V103616	RRWW H 2E2 K 4.00	R32
C103626	RRWW H 15E K 4.00	R31
V103653	RRWW H270E K 4.00	R30
C1046621	RRHV 2M2 J 1.00	R48
V104664	RRHV 2M7 J 0.50	R44
C104670	RRHV 3M9 J 0.50	R47
V104678	RRHV 10M J 0.50	R62
V106517	RTWW KH 1K K 2.00	P2
V106733 *	RTCEM H100K K 0.50	P6
V106829	RTCEM V 10K K 0.50	P1
V106833 *	RTCEM V100K K 0.50	P3
V107253	RP 2M2 LIN P20E	P5
C107610 ⚠	RP FOC 761052 01	P4
V111157	CELAX 22M Z 25	C19
V111159	CELAX 47M T 25	C15 ,C16
V1111841	CELAX 1M T 40	C4
V111196	CELAX 2M2 Z 63	C13
C1113999	CELPR 47M M 160	C21

Order number	Description	Item
V111466	CELPR 100M Z 16	C23
V1115465	CELPR 1M M5 50	C8
C111760	CPP DD 1K J 2000	C14
C112741	CCE MI 1K5 K5 63	C10
C112763	CCE MI 10K U5 63	C'3 ,C3
C112774	CCE MI100K S5 63	C'22,C11 ,C22 ,C7 ,C9
C112825	CCE DI IK S 400	C7
V114024	CPOMEPO 3K3 K 250	C20
C114122	CPOMEFF 15K K 250	C2
V114130	CPOMEFF 68K K 250	C12 ,C24
V1145961	CPPMEPO910K K 250	C17
C114636	CPOMEPO 47K M 1200	C18
V115165	CPP PO 3K3 J5 63	C1
C1160505	CPS AX 4K7 G 63	C5
V1314071	SMCTRA BC 547 B	Q1 ,Q3 ,Q7
V1314131	SMCTRA BC 557 B	Q10 ,Q2
V131426	SMCTRA BC 337	Q4
V131621	SMCDIO BAX 13	D1 ,D10 ,D2 ,D3 ,D4
C131733	SMCDIOZEN 0.4W C2V1	Z1
C131910	SMCDIO PY 207	D7 ,D8
V131917	SMCDIOREC BY 228	D5
C132071 ⚠	SMCDIOREC BG2097-641	D9 (TRIPLER)
V132517	SMCTRA BUX 84	Q9
C132562	SMCTRA BC 639	Q5
C132574	SMCTRA BU 508 A	Q6
C133052	SMCTRA COOLER T0220	
C133054	SMCTRA CLIP SOT93	
C133055	SMCTRA ISO PL SOT93	
V134005	SMCICLVOL LM 339	IC2
C137296	SMCICL TL 494	IC1
V3061282	CHOKE AX NS 4.7UH	L2
C306724	TRF DRIV AT4043/59	T1 ,T2
C313590	CON MOB SE AU C P32	32 PINS CONNECTOR
V315331	SOLDERLUG1 D3.2 L12	
V3242011	SW.SLIDE MI INCA1XU	SYNC SAFEGUARD SWITCH
C600193	COOLER EHT CD351	FOR Q9
C605103	PCB EHT SUP CD351	PRINTED CIRCUIT BOARD
C671005	TRF EHT CHOKE	L1
C671006 * ⚠	TRF EHT CD351	T3
V7290351	PCB GRIP UNIVERSAL	
V750443	TRANSISTORCLIPS	

R	25. 24.12.39.41.42.40.1.50.57. 2.43. 8 3.19.20. 4.5.22.23 15.16.21. 65 26 17.27. 14 10.11.18. 9.28. 66.7.13. 6. 29 63 64.55.51 31. 56.30 46 58.52. 53.32.33. 34.35. 37A.37B 36 48.45 38 62. 47 59 44
C	1. 15.16. 7 8 6 9 . 4 5 10 3A 3B 11 24 20.13 12.23.19 21 14 22A.22B.17. 18
MISC.	P2.D3. D2.D1.D4. Q3 IC2 Q2 Q1 Q4 D10 P1 IC1 Z1 Q7 Q10.Q5 T1.T2. D11. Q9 L1 Q6.L3 D8.D7.D5 P3 T3 P6 D9 P4 P5


WHITE UNIFORMITY COIL
W.U
A 16
CON.A
CON.B
-16V
+17V
H.Sc.F.
V.Sc.F.
H. SYNC
W.U
F.S
Sc.F
ΛLP
VG2
+180V
+180V
B24
+17V
A8
SR39
C15 47μF
R41 82
P2 1K
R42 82
C16 47μF
SR40 100
OFF
ON
WHITE UNIFORMITY
-16V
A4
+5V
R14 4K7
R10 47K
R9 10K
C2 15K
R6 330K
R7 470K
R58 100
+17V
CURRENT LIMIT ADJUST
P1 10K
R11 8K2
C4 1μF
R65 2M2
Z1 2V1
R56 33
C23 100μF
R55 5K6
Q10 BC557B
+140V
L3 CT73028
R34 22K
EHT LIMITER
IC2 LM339
EHT LIMIT ADJUST
P3 100K
R35 18K
R59 470
F.S
A20
4
B28
fail safe
SYNC CIRCUIT
Q2 BC557B
R4 47K
R15 82K
R3 10K
R5 120K
R16 5K6
IC1 TL 494
DEAD TIME CONTROL
OSCILLATOR
REGULATOR
PULSE WIDTH MODULATOR/ DRIVE TRANSISTOR
C20 3K3
R51 470
T1
R52 4,7
R53 56
Q9 BUX84
D8 PY207
C21 47μF
D7 PY207
D9 TRIPLER
BG 2097-641
47K
300M
EHT
To CRT
+8KV
Horizontal flyback pulse
B4
2
A30
ΛLP
C1 3K3
R1 47K
R2 47K
Q3 BC547B
Q1 BC547B
C5 4K7
R17 330K
R18 10K
C3A 2K2
C3B 2K2
C24 15K
R66 470
R13 47K
R6 10K
C6 1K5
L1
R36 220K
C22A 100K
C22B 100K
R37A 100K
R37B 100K
H.Sync.
30
6
A14
R25 1K
C7 100K
D3 BAX13
D2 BAX13
+17V
SYNC SAFEGUARD
OFF
ON
R24 100K
R43 10K
C8 1μF
IC2 LM339
SAFE GUARD CIRCUIT
R19 10K
R22 33K
R21 10K
R23 18K
C9 100K
DRIVE PULSE FORMER
IC2 LM339
R26 100
R27 120K
C10 1K5
R28 1M
C11 100K
IC2 LM339
R29 1K8
R63 470E
R31 15 4W
C13 2,2μF
T2
D11 PY207
R32 6.8 4W
L2
Q5 BC639
C12 15K
R64 470
R30 680 2,5W
R33 47
Q6 BU508
D5 BY228
C14 1K 2000V
FLYBACK GENERATOR
T3
C17 910K
R48 2M2 1W
C18 47K
P4 FOCUS ADJUST
focus
11
horizontal scan failure
H.Sc.F
B26
2
A10
D1 BAX13
R50 10K
vertical scan failure
V.Sc.F
30
5
A12
R12 2K2
D4 BAX13
R57 10K
R20 10K
Q4 BC337
D10 BAX13
BEAM CURRENT LIMITER
Q7 BC547B
R46 100
C19 22μF
EHT ADJUST
P6 100K
R47 3M9
VG2 ADJUST
P5 2M2
VG2
B2
11
SR45 820
R62 10M
R44 2M7
JUMPER SOLDERED FOR LOW FOCUS RANGE
A 22
SC.F
12
Scan failure indication

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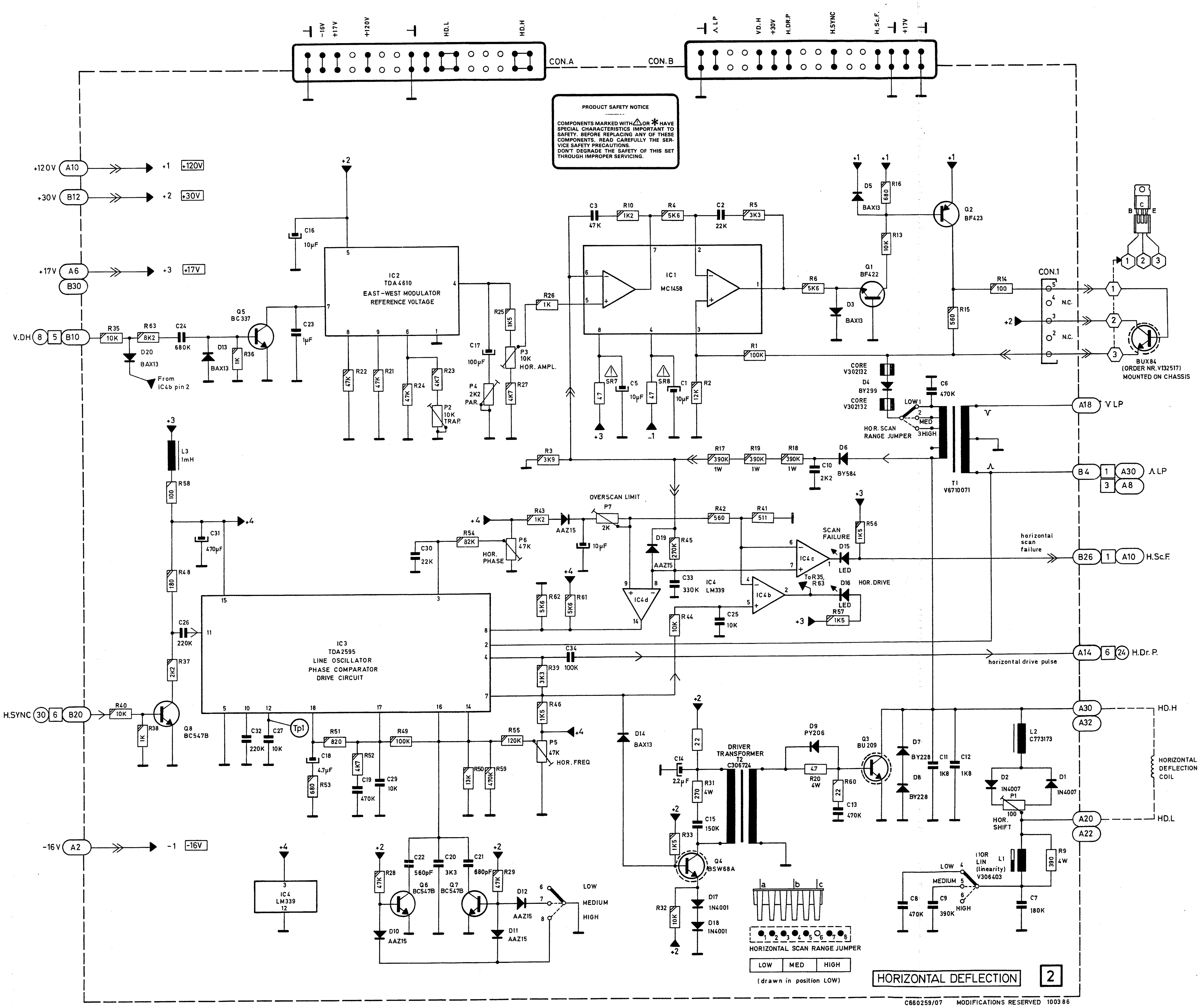
EHT SUPPLY 1

C 66 024 0/01 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 1
EHT SUPPLY
Order number of a complete unit: C660240

Order number	Description	Item
C101108	RRCF 4E7 J 0.25	R52
C101118	RRCF 33E J 0.25	R56
C101121	RRCF 56E J 0.25	R53
C101123	RRCF 82E J 0.25	R41 ,R42
C101124	RRCF 100E J 0.25	R26 ,R46
V1011249 ⚠	RRCFF 100E J 0.30	R39 ,R40 ,R58
C101132	RRCF 470E J 0.25	R51 ,R59 ,R63 ,R64
V101132	RRCF 470E J 0.25	R66
C101136	RRCF 1K J 0.25	R25
C101139	RRCF 1K8 J 0.25	R29
C101140	RRCF 2K2 J 0.25	R12
C101144	RRCF 4K7 J 0.25	R14
V101145	RRCF 5K6 J 0.25	R16
C101145	RRCF 5K6 J 0.25	R55
C101147	RRCF 8K2 J 0.25	R11
C101148	RRCF 10K J 0.25	R18 ,R19 ,R20 ,R21 ,R3 ,R43 ,R50 R57 ,R8 ,R9
C101151	RRCF 18K J 0.25	R23 ,R35
C101152	RRCF 22K J 0.25	R34
V101154	RRCF 33K J 0.25	R22
C101156	RRCF 47K J 0.25	R1 ,R10 ,R13 ,R2 ,R4
C101159	RRCF 82K J 0.25	R15
C101160	RRCF 100K J 0.25	R'37,R24 ,R37
C101161	RRCF 120K J 0.25	R27 ,R5
C101164	RRCF 220K J 0.25	R36
C101166	RRCF 330K J 0.25	R17 ,R6
C101168	RRCF 470K J 0.25	R7
C101172	RRCF 1M J 0.25	R28
C101176	RRCF 2M2 K 0.25	R65
C101220	RRCF 47E J 0.50	R33
C1012359 ⚠	RRCFF 820E J 0.50	R45
V102334	RRMF 680E J 2.50	R30
V103622	RRWW H 6E8 K 4.00	R32
C103626	RRWW H 15E K 4.00	R31
C1046621	RRHV 2M2 J 1.00	R48
V104664	RRHV 2M7 J 0.50	R44
C104670	RRHV 3M9 J 0.50	R47
V104678	RRHV 10M J 0.50	R62
V106517	RTWW KH 1K K 2.00	P2
V106733 *	RTCEM H100K K 0.50	P6
V106829	RTCEM V 10K K 0.50	P1
V106833 *	RTCEM V100K K 0.50	P3
V107253	RP 2M2 LIN P20E	P5
C107610 ⚠	RP FOC 761052 01	P4
V111157	CELAX 22M Z 25	C19
V111159	CELAX 47M T 25	C15 ,C16
V1111841	CELAX 1M T 40	C4
V111196	CELAX 2M2 Z 63	C13
C1114189	CELPR 22M M 350	C21
V111466	CELPR 100M Z 16	C23
V1115465	CELPR 1M M5 50	C8
C111760	CPP DD 1K J 2000	C14
C112741	CCE MI 1K5 K5 63	C10
C112774	CCE MI100K S5 63	C'22,C11 ,C22 ,C7 ,C9
V114024	CPOMEPO 3K3 K 250	C20
V114032	CPOMEPO 15K K 250	C12 ,C24
C114122	CPOMEFF 15K K 250	C2
V114482	CPO PO 2K2 M5 100	C'3 ,C3
V1145961	CPPMEPO910K K 250	C17
C114636	CPOMEPO 47K M 1200	C18
V115124	CPOMEPO 1K5 M 400	C6
V115165	CPP PO 3K3 J5 63	C1
C1160505	CPS AX 4K7 G 63	C5
V1314071	SMCTRA BC 547 B	Q1 ,Q3 ,Q7
V1314131	SMCTRA BC 557 B	Q10 ,Q2
V131426	SMCTRA BC 337	Q4
V131621	SMCDIO BAX 13	D1 ,D10 ,D2 ,D3 ,D4
C131733	SMCDIOZEN 0.4W C2V1	Z1
C131910	SMCDIO PY 207	D11 ,D7 ,D8
V131917	SMCDIOREC BY 228	D5
C132071 ⚠	SMCDIOREC BG2097-641	D9 (TRIPLER)
V132517	SMCTRA BUX 84	Q9
C132562	SMCTRA BC 639	Q5
C132574	SMCTRA BU 508 A	Q6
C133052	SMCTRA COOLER T0220	
C133054	SMCTRA CLIP SOT93	
C133055	SMCTRA ISO PL SOT93	
V134005	SMCICLVOL LM 339	IC2
C137296	SMCICL TL 494	IC1
C306724	TRF DRIV AT4043/59	T1 ,T2
C313590	CON MOB SE AU C P32	32 PINS CONNECTOR
V315331	SOLDERLUG1 D3.2 L12	
V3242011	SW.SLIDE MI INCA1XU	SYNC SAFEGUARD SWITCH
C600193	COOLER EHT CD351	FOR Q9
C605103	PCB EHT SUP CD351	PRINTED CIRCUIT BOARD
C671005	TRF EHT CHOKE	L1
C671006 * ⚠	TRF EHT CD351	T3
V750443	TRANSISTORCLIPS	
C773028	SPOCHOKE SMPOWER 31	L3

R	40 38, 35.63, 58,48,37, 36 53, 51, 22,52 21,28, 49 24 23 54,50, 59,29,25,27,55,26,3,62,61,43.39, 46, 7 10, 8, 4,45,33,32,44,30,31,2,17,42, 5,1,19,41, 18 6,20, 57,60,56, 13,16, 15 14 9
C	24,26,31 32, 27, 16,23,18, 19 29 22 30 20 21 17 34, 3 5 . 1,33,14,15, 25 2 10 13 8, 6, 11,9, 12 7
MISC.	Q8,L3. D13 Q5 IC4 IC3 IC2 D10,Q6, P2 P4,Q7,D11, P3,P6,D12 P5 P7 D14,IC4d, IC1,D19,Q4,D17,D18, T2 IC4b IC4c,D9,D3,D6,D15,D16,D5,Q1,D4,Q3, D7,D8, T1 Q2, D2, P1, L1, L2, D1



CON.A
CON.B
-16V
+17V
+120V
HD.L
HD.H
Λ LP
VD.H
+30V
H.DR.P
H.SYNC
H.Sc.F.
+17V
+120V A10
+30V B12
+17V A6 B30
V.DH 8 5 B10
H.SYNC 30 6 B20
-16V A2
+1 +120V
+2 +30V
+3 +17V
-1 -16V
IC2 TDA4610 EAST-WEST MODULATOR REFERENCE VOLTAGE
IC1 MC1458
IC3 TDA2595 LINE OSCILLATOR PHASE COMPARATOR DRIVE CIRCUIT
IC4 LM339
Q5 BC337
Q8 BC547B
Q1 BF422
Q2 BF423
Q3 BU209
Q4 BSW68A
Q6 BC547B
Q7 BC547B
BUX84 (ORDER NR. V132517) MOUNTED ON CHASSIS
CON.1
N.C.
P3 10K HOR. AMPL.
P4 2K2 PAR.
P2 10K TRAP.
P6 47K HOR. PHASE
P7 2K OVERSCAN LIMIT
P5 47K HOR. FREQ
P1 100 HOR. SHIFT
CORE V302132
D4 BY299
HOR. SCAN RANGE JUMPER
LOW 1 MED 2 3 HIGH
T1 V6710071
A18 V LP
B4 1 A30 Λ LP 3 A8
SCAN FAILURE
D15 LED
D16 LED HOR. DRIVE
horizontal scan failure
B26 1 A10 H.Sc.F.
horizontal drive pulse
A14 6 24 H.Dr.P.
DRIVER TRANSFORMER T2 C306724
L2 C773173
A30 A32 HD.H
HORIZONTAL DEFLECTION COIL
A20 A22 HD.L
L1 10R LIN (linearity) V306403
LOW MEDIUM HIGH
HORIZONTAL SCAN RANGE JUMPER
LOW MED HIGH
(drawn in position LOW)
L3 1mH
D20 BAX13
From IC4b pin 2
Tp1

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

HORIZONTAL DEFLECTION 2

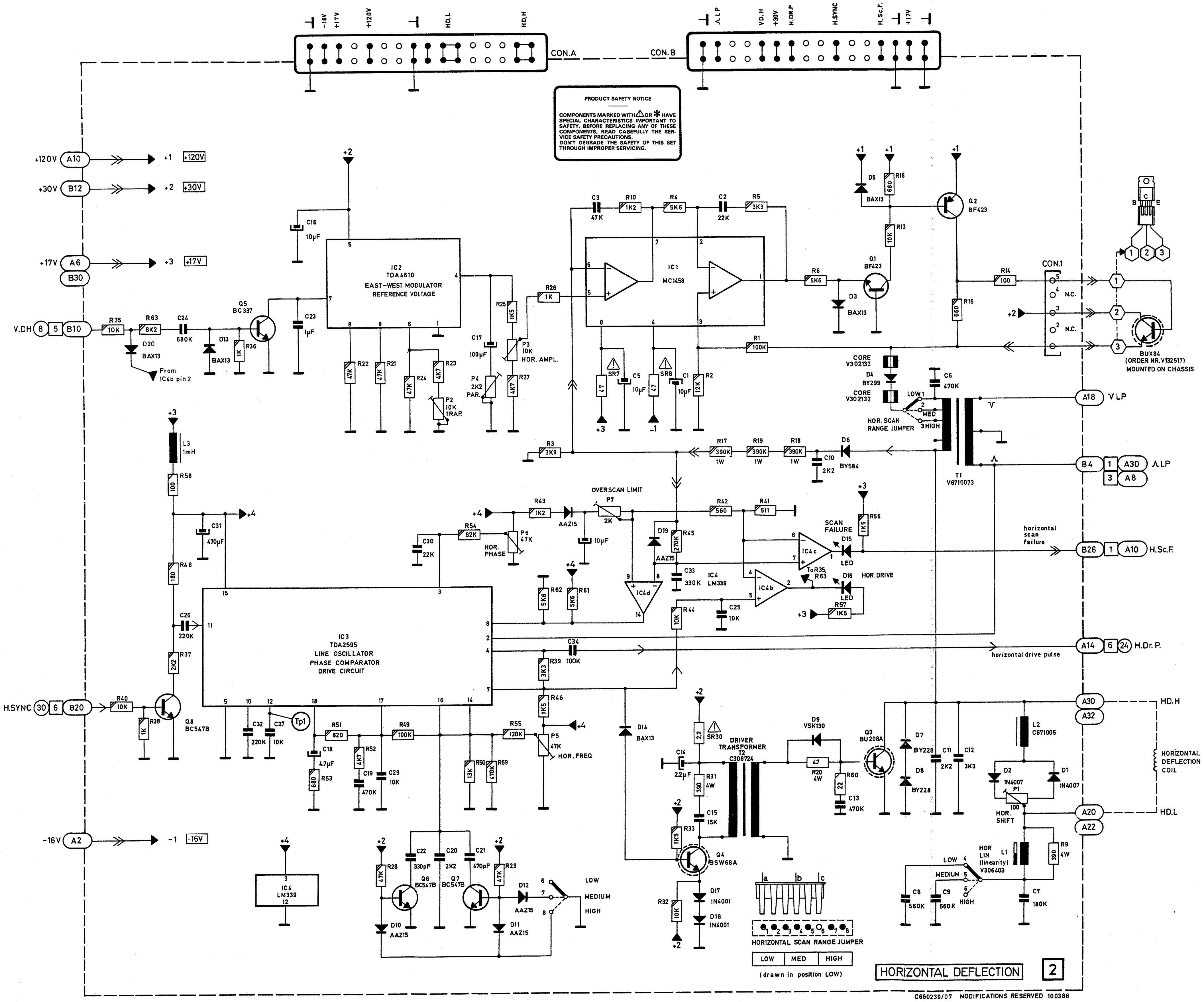
C660259/07 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 2
HORIZONTAL DEFLECTION

Order number of a complete unit: C660259

Order number	Description	Item
V1011209 ⚠	RRCFF 47E J 0.25	R7 ,R8
V101124	RRCF 100E J 0.25	R14
V101127	RRCF 180E J 0.25	R48
V101133	RRCF 560E J 0.25	R15 ,R42
V101134	RRCF 680E J 0.25	R16 ,R53
V101135	RRCF 820E J 0.25	R51
V101136	RRCF 1K J 0.25	R26 ,R36 ,R38 ,R47 ,R64
V101137	RRCF 1K2 J 0.25	R10 ,R43 ,R5
V101138	RRCF 1K5 J 0.25	R25 ,R46 ,R56 ,R57
V101140	RRCF 2K2 J 0.25	R37
V101142	RRCF 3K3 J 0.25	R39
V101143	RRCF 3K9 J 0.25	R3
V101144	RRCF 4K7 J 0.25	R23 ,R27 ,R52
V101145	RRCF 5K6 J 0.25	R4 ,R6 ,R61 ,R62
V101147	RRCF 8K2 J 0.25	R63
V101148	RRCF 10K J 0.25	R13 ,R32 ,R35 ,R40 ,R44
V101149	RRCF 12K J 0.25	R2
V101156	RRCF 47K J 0.25	R21 ,R22 ,R24 ,R28 ,R29
V101159	RRCF 82K J 0.25	R54
V101160	RRCF 100K J 0.25	R1 ,R49
V101161	RRCF 120K J 0.25	R55
V101164	RRCF 220K J 0.25	R59
V101165	RRCF 270K J 0.25	R45
V101216	RRCF 22E J 0.50	R60
V101224	RRCF 100E J 0.50	R58
V101238	RRCF 1K5 J 0.50	R33
V101257	RRCF 56K J 0.50	R34
V1021672	RRCC 390K J 1.00	R17 ,R18 ,R19
C102549	RRMF 12K G 0.25	R50
V1026685	RRMF 511E F 0.40	R41
V103622	RRWW H 6E8 K 4.00	R20
V103628	RRWW H 22E K 4.00	R30
V103653	RRWW H270E K 4.00	R31
C103660	RRWW H 1K K 4.00	R9
C1062051	RTCAPPV 2K2 M 0.20	P4
C1062071	RTCAPPV 10K M 0.20	P2 ,P3
C1062091	RTCAPPV 47K M 0.20	P5 ,P6
C106511	RTWW KH100E K 2.00	P1
V106726	RTCEM H 1K K 0.50	P7
V111156	CELAX 10M Z 25	C1 ,C5
V111161	CELAX 100M T 25	C17
C111184	CELAX 4M7 Z 40	C18
C1111851	CELAX 10M Z 40	C16
V111196	CELAX 2M2 Z 63	C14
V111468	CELPR 470M Z 16	C31
C112774	CCE MI100K S5 63	C34
V114030	CPOMEPO 10K K 250	C27 ,C29
V114034	CPOMEPO 22K K 250	C2 ,C30
V114038	CPOMEPO 47K K 250	C3
V1140422	CPOMEPO100K K 100	C28
V1140442	CPOMEPO150K K 100	C15
V114045	CPOMEPO180K K 250	C7
V1140462	CPOMEPO220K K 100	C26 ,C32
V114049	CPOMEPO390K K 400	C9
V114050	CPOMEPO470K K 250	C8
V114080	CPOMEPO 10K K5 63	C25
V114091	CPOMEPO330K K5 50	C33
V114092	CPOMEPO470K K5 50	C19
V114094	CPOMEPO680K M5 50	C24
V114096	CPOMEPO 1M K5 50	C23
C114104	CPOMEFF470K K 100	C13
C114442	CPO FF470K K 250	C6
V115009	CPP PO 1K8 J 1500	C11 ,C12
V115010	CPP PO 2K2 J 1500	C10
V116302	CPP PR 3K3 H 63	C20
V116310	CPP PR 680P H 160	C21
V1163261	CPP PR 560P H 630	C22
V1314071	SMCTRA BC 547 B	Q6 ,Q7 ,Q8
V131426	SMCTRA BC 337	Q5
V131504	SMCDIO AAZ 15	D10 ,D11 ,D12 ,D19
V131621	SMCDIO BAX 13	D13 ,D14 ,D20 ,D3 ,D5
C131644	SMCDIOREC 1N4001	D17 ,D18
C131646	SMCDIOREC 1N4007	D1 ,D2
V131662	SMCDIOLED 3MM RED	D15 ,D16
C131907	SMCDIOREC BY 584	D6
C131911	SMCDIOREC PY 206	D9
V131917	SMCDIOREC BY 228	D7 ,D8
V131921	SMCDIOREC BY 299	D4
V132508	SMCTRA BU 209	Q3
V132516	SMCTRA BF 422	Q1
V132552	SMCTRA BF 423	Q2
V132557	SMCTRA BSW 68 A	Q4
V133012	SMCTRACOOLER TO-5	
V1330135	SMCTRAFIX 5MM TO 5	
V133031	SMCTRA ISO PL TO 3	
V1330341	SMCTRA COVER TO 3	
V134005	SMCICLVOL LM 339	IC4
V134114	SMCICLOPA MC 1458	IC1
C137713	SMCICL TDA4610	IC2
V137719	SMCIC TDA2595	IC3
V302132	CORE CHO 3/6 X10	
C3061562	CHOKE AX NS 1 MH	L3
V306403	COIL LIN AT4042/02	L1
C306724	TRF DRIV AT4043/59	T2
C313590	CON MOB SE AU C P32	CONA,CONB
C313659	CON HOUSE SV P 6	FOR SCAN RANGE JUMPER
C313660	CON MOB TE SV P 8	CON2
V3137050	CON MOB TE MTIS P 5	CON1
V600385	PCB HD SCREEN	
V6710071	TRF HOR DEFL 2 CD 35	T1
C712552	HEATSINK SM POWER	
V7290351	PCB GRIP UNIVERSAL	
V729125	ISOLATION TRA	
V751197	PCB HOR DEF	PRINTED CIRCUIT BOARD
C773173	SPOCHOKE HOR EHT 31	L2

R	40 38, 35.63, 58,48,37, 36 53, 51, 22,52 21,28, 49 24 23 54,50, 59,29,25,27,55,26,3,62,61,43.39, 46, 7 10, 8, 4,45,33,32,44,30,31,2,17,42, 5,1,19,41, 18 6,20. 57,60,56, 13,16, 15 14 9
C	24,26.31 32, 27, 16,23,18, 19 29 22 30 20 21 17 34, 3 5 1,33,14,15, 25 2 10 13 8, 6, 11,9, 12 7
MISC.	Q8,L3. D13 Q5 IC4 IC3 IC2 D10,Q6, P2 P4,Q7,D11, P3,P6,D12 P5 P7 D14,IC4d, IC1, D19, Q4,D17,D18, T2 IC4b IC4c,D9, D3,D6,D15,D16,D5,Q1,D4,Q3, D7,D8, T1 Q2, D2, P1, L1, L2, D1


CON.A
CON.B
-16V
+17V
+120V
HD.L
HD.H
Λ LP
VD.H
+30V
H.DR.P
H.SYNC
H.Sc.F.
+17V
+120V A10 +1 +120V
+30V B12 +2 +30V
+17V A6 B30 +3 +17V
V.DH 8 5 B10
R35 10K
R63 8K2
C24 680K
D20 BAX13
From IC4b pin 2
D13 BAX13
R36 1K
Q5 BC337
C23 1µF
C16 10µF
IC2 TDA4610 EAST-WEST MODULATOR REFERENCE VOLTAGE
R22 47K
R21 47K
R24 47K
R23 4K7
P2 10K TRAP.
C17 100µF
P4 2K2 PAR.
R25 1K5
P3 10K HOR. AMPL.
R27 4K7
R26 1K
C3 47K
R10 1K2
R4 5K6
C2 22K
R5 3K3
IC1 MC1458
SR7 47
C5 10µF
SR8 47
C1 10µF
R2 12K
R1 100K
R6 5K6
Q1 BF422
D3 BAX13
D5 BAX13
R16 680
R13 10K
Q2 BF423
R14 100
R15 560
CON.1
N.C.
BUX84 (ORDER NR. V132517) MOUNTED ON CHASSIS
CORE V302132
D4 BY299
CORE V302132
C6 470K
LOW 1 2 MED 3 HIGH
HOR. SCAN RANGE JUMPER
T1 V6710073
A18 V LP
B4 1 A30 Λ LP
3 A8
R3 3K9
R17 390K 1W
R19 390K 1W
R18 390K 1W
C10 2K2
D6 BY584
L3 1mH
R58 100
C31 470µF
R48 180
C26 220K
R37 2K2
H.SYNC 30 6 B20
R40 10K
R38 1K
Q8 BC547B
IC3 TDA2595 LINE OSCILLATOR PHASE COMPARATOR DRIVE CIRCUIT
C32 220K
C27 10K
Tp1
R51 820
C18 4.7µF
R53 680
R52 4K7
C19 470K
C29 10K
R49 100K
R50 13K
R59 470K
R55 120K
P5 47K HOR. FREQ
R54 82K
P6 47K HOR. PHASE
C30 22K
R43 1K2
AAZ15
OVERSCAN LIMIT P7 2K
C10µF
R62 5K6
R61 5K6
D19 AAZ15
R45 270K
C33 330K
IC4 LM339
IC4d
R42 560
R41 511
IC4c
IC4b
SCAN FAILURE D15 LED
D16 LED HOR. DRIVE
To R35, R63
R56 1K5
R57 1K5
R44 10K
C25 10K
C34 100K
R39 3K3
R46 1K5
horizontal scan failure
B26 1 A10 H.Sc.F.
horizontal drive pulse
A14 6 24 H.Dr.P.
-16V A2 -1 -16V
IC4 LM339
R28 47K
C22 330pF
C20 2K2
C21 470pF
R29 47K
Q6 BC547B
Q7 BC547B
D10 AAZ15
D11 AAZ15
D12 AAZ15
LOW MEDIUM HIGH
D14 BAX13
SR30 2.2
C14 2.2µF
R31 390 4W
C15 15K
R33 1K5
Q4 BSW68A
R32 10K
D17 1N4001
D18 1N4001
D9 VSK130
DRIVER TRANSFORMER T2 C306724
R20 47 4W
R60 22
C13 470K
Q3 BU208A
D7 BY228
D8 BY228
C11 2K2
C12 3K3
A30 A32 HD.H
HORIZONTAL DEFLECTION COIL
L2 C671005
D2 1N4007
D1 1N4007
P1 100 HOR. SHIFT
A20 A22 HD.L
R9 390 4W
HOR LIN (linearity) V306403 L1
LOW MEDIUM HIGH
C8 560K
C9 560K
C7 180K
a b c
HORIZONTAL SCAN RANGE JUMPER
LOW MED HIGH
(drawn in position LOW)

PRODUCT SAFETY NOTICE

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HORIZONTAL DEFLECTION 2

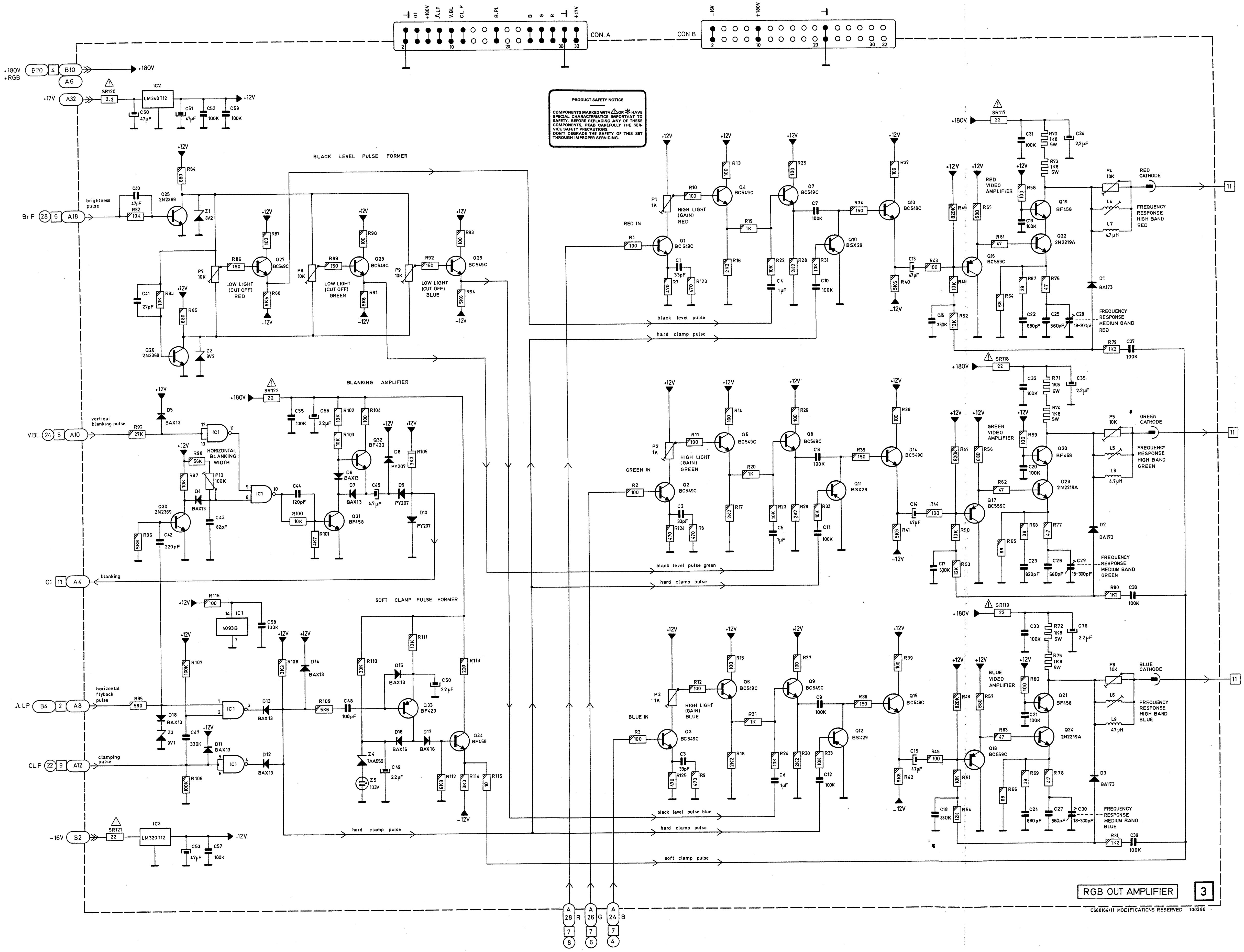
C660239/07 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 2
HORIZONTAL DEFLECTION

Order number of a complete unit: C660239

Order number	Description	Item
V1011209	⚠ RRCFF 47E J 0.25	R7 ,R8
V101124	RRCF 100E J 0.25	R14
V101133	RRCF 560E J 0.25	R15 ,R42
V101134	RRCF 680E J 0.25	R16 ,R53
V101137	RRCF 1K2 J 0.25	R10 ,R43
V101145	RRCF 5K6 J 0.25	R4 ,R6 ,R61 ,R62
V101147	RRCF 8K2 J 0.25	R63
V101149	RRCF 12K J 0.25	R2
V101161	RRCF 120K J 0.25	R55
V101165	RRCF 270K J 0.25	R45
V101168	RRCF 470K J 0.25	R59
C1012049	⚠ RRCFF 2E2 J 0.50	R30
V101216	RRCF 22E J 0.50	R60
V101224	RRCF 100E J 0.50	R58
V101227	RRMF 180E J 0.50	R48
V101235	RRMF 820E J 0.50	R51
V101236	RRMF 1K J 0.50	R26 ,R36 ,R38 ,R47 ,R64
C101238	RRCF 1K5 J 0.50	R33
V101238	RRMF 1K5 J 0.50	R25 ,R46 ,R56 ,R57
V101240	RRMF 2K2 J 0.50	R37
V101242	RRMF 3K3 J 0.50	R5 ,R39
V101243	RRMF 3K9 J 0.50	R3
V101244	RRMF 4K7 J 0.50	R23 ,R27 ,R52
V101248	RRMF 10K J 0.50	R13 ,R32 ,R35 ,R40 ,R44
V101256	RRMF 47K J 0.50	R21 ,R22 ,R28 ,R29
C101257	RRCF 56K J 0.50	R34
V101259	RRMF 82K J 0.50	R54
V101260	RRMF 100K J 0.50	R1 ,R24 ,R49
V1021672	RRCC 390K J 1.00	R17 ,R18 ,R19
V1026117	RRMF 13K F 0.40	R50
V1026685	RRMF 511E F 0.40	R41
V103620	RRWW H 4E7 K 4.00	R20
V103657	RRWW H390E K 4.00	R9 ,R31
C1062051	RTCAPPV 2K2 M 0.20	P4
C1062071	RTCAPPV 10K M 0.20	P2 ,P3
C1062091	RTCAPPV 47K M 0.20	P5 ,P6
C106511	RTWW KH100E K 2.00	P1
V106827	RTCEM H 2K K 0.50	P7
V111156	CELAX 10M Z 25	C1 ,C5 ,C35
V111161	CELAX 100M T 25	C17
C111184	CELAX 4M7 Z 40	C18
C1111851	CELAX 10M Z 40	C16
V111196	CELAX 2M2 Z 63	C14
V111468	CELPR 470M Z 16	C31
C112774	CCE MI100K S5 63	C34
V114030	CPOMEPO 10K K 250	C27 ,C29
V114032	CPOMEPO 15K K 250	C15
V114034	CPOMEPO 22K K 250	C2 ,C30
V114038	CPOMEPO 47K K 250	C3
V114045	CPOMEPO180K K 250	C7
V1140462	CPOMEPO220K K 100	C26 ,C32
V114051	CPOMEPO560K K 250	C8 ,C9
V114080	CPOMEPO 10K K5 63	C25
V114091	CPOMEPO330K K5 50	C33
V114092	CPOMEPO470K K5 50	C19
V114094	CPOMEPO680K M5 50	C24
V114096	CPOMEPO 1M K5 50	C23
C114104	CPOMEFF470K K 100	C13
C114442	CPO FF470K K 250	C6
V115010	CPP PO 2K2 J 1500	C10 ,C11
V1150103	CPP PO 3K3 J 1500	C12
V116301	CPP PR 2K2 H 63	C20
V116324	CPP PR 330P H 630	C22
V116325	CPP PR 470P H 630	C21
V1314071	SMCTRA BC 547 B	Q6 ,Q7 ,Q8
V131426	SMCTRA BC 337	Q5
V131504	SMCDIO AAZ 15	D10 ,D11 ,D12 ,D19 ,D 21
V131621	SMCDIO BAX 13	D13 ,D14 ,D20 ,D3 ,D5
C131644	SMCDIOREC 1N4001	D17 ,D18
C131646	SMCDIOREC 1N4007	D1 ,D2
V131662	SMCDIOLED 3MM RED	D15 ,D16
C131907	SMCDIOREC BY 584	D6
V131917	SMCDIOREC BY 228	D7 ,D8
V131921	SMCDIOREC BY 299	D4
V131930	SBMDIOREC SB 130	D9
V132509	SMCTRA BU 208 A	Q3
V132516	SMCTRA BF 422	Q1
V132552	SMCTRA BF 423	Q2
V132557	SMCTRA BSW 68 A	Q4
V133012	SMCTRACOOLER TO-5	
V1330135	SMCTRAFIX 5MM TO 5	
V133031	SMCTRA ISO PL TO 3	
V1330341	SMCTRA COVER TO 3	
V134005	SMCICLVOL LM 339	IC4
V134114	SMCICLOPA MC 1458	IC1
C137713	SMCICL TDA4610	IC2
V137719	SMCIC TDA2595	IC3
V302132	CORE CHO 3/6 X10	
C3061562	CHOKE AX NS 1 MH	L3
V306403	COIL LIN AT4042/02	L1
C306724	TRF DRIV AT4043/59	T2
C313590	CON MOB SE AU C P32	CONA,CONB
C313659	CON HOUSE SV P 6	FOR SCAN RANGE JUMPER
C313660	CON MOB TE SV P 8	CON2
V3137050	CON MOB TE MTIS P 5	CON1
V600385	PCB HD SCREEN	
C671005	TRF EHT CHOKE	L2
V6710073	TRF HOR DEFL CDCT6351	T1
C712552	HEATSINK SM POWER	
V7290351	PCB GRIP UNIVERSAL	
V729125	ISOLATION TRA	
V751197	PCB HOR DEF	PRINTED CIRCUIT BOARD
V775238	COIL LIN CDCT5000	L'1

R	121,120.	99,96,95. 83	84,85,97,106,107,98. 116.	86	87,88,122,108.	100	101,109.	89,102,103.	90. 91,104,110.	105,111.	92,112.	93,94,113,114. 115.	1,2,3.	7. 124.	125,10,123, 11,8,12,9, 13,16,14,17,15,18,19,20,21,22,23,24,25,28,26,29,27,30.	31,32,33.	34,35,36.	37,40,38,41,39,42.	43,44,45,46,49,52,47,50,53,48,51,54,55,56,57,117,58,61,64,118,59,62,65,119,60,63,66,67,68,69,70,73,76,71,74,77,72,75,78,79,80,81				
C		60,40,41,42. 47,53.	51,57. 52,43.	59	58	55,44.	56	48	45,49.		50			1,2,3.	4,5,6.	7,10,11,12.		13,14,15	16,17,18	31,19,22. 32. 20,23,33,21.24,25,26,27,34,28.35,29,36,30.	37. 38, 39		
MISC.		IC2,D5,D18,Z3,IC3,Q25,Q26,Q30,Z1,Z2,D4,P7. IC1,P10,D11,D13,D12,Q27, D14,P8.					Q31.	D7,Q28,Q32,Z4,Z5, D8,D9,D15,D16,P9,D10, D17,Q33, Q29,Q34.					P1,Q1, P2,Q 2,P3,Q3.	Q4,Q5,Q6	Q7, Q8,Q9	Q10,Q11, Q12		Q13,Q14,Q15	Q16,Q17,Q18.	Q19,Q22,Q20,Q23, Q21,Q24.	D1,D2,D3, P4,L4,L7,P5,L5,L8, P6,L6,L9		


CON.A
CON.B
G1
+180V
ΛLP
V.BL
CL.P
B.PL
B
G
R
+17V
-16V
+RGB
Br P
V.BL
G1
ΛLP
CL.P
brightness pulse
vertical blanking pulse
blanking
horizontal flyback pulse
clamping pulse
BLACK LEVEL PULSE FORMER
BLANKING AMPLIFIER
SOFT CLAMP PULSE FORMER
LOW LIGHT (CUT OFF) RED
LOW LIGHT (CUT OFF) GREEN
LOW LIGHT (CUT OFF) BLUE
HORIZONTAL BLANKING WIDTH
IC2 LM340T12
IC3 LM320T12
IC1 4093B
RED IN
GREEN IN
BLUE IN
HIGH LIGHT (GAIN) RED
HIGH LIGHT (GAIN) GREEN
HIGH LIGHT (GAIN) BLUE
RED VIDEO AMPLIFIER
GREEN VIDEO AMPLIFIER
BLUE VIDEO AMPLIFIER
RED CATHODE
GREEN CATHODE
BLUE CATHODE
FREQUENCY RESPONSE HIGH BAND RED
FREQUENCY RESPONSE HIGH BAND GREEN
FREQUENCY RESPONSE HIGH BAND BLUE
FREQUENCY RESPONSE MEDIUM BAND RED
FREQUENCY RESPONSE MEDIUM BAND GREEN
FREQUENCY RESPONSE MEDIUM BAND BLUE
black level pulse
hard clamp pulse
black level pulse green
black level pulse blue
soft clamp pulse
A 28 R
A 26 G
A 24 B

PRODUCT SAFETY NOTICE

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RGB OUT AMPLIFIER 3

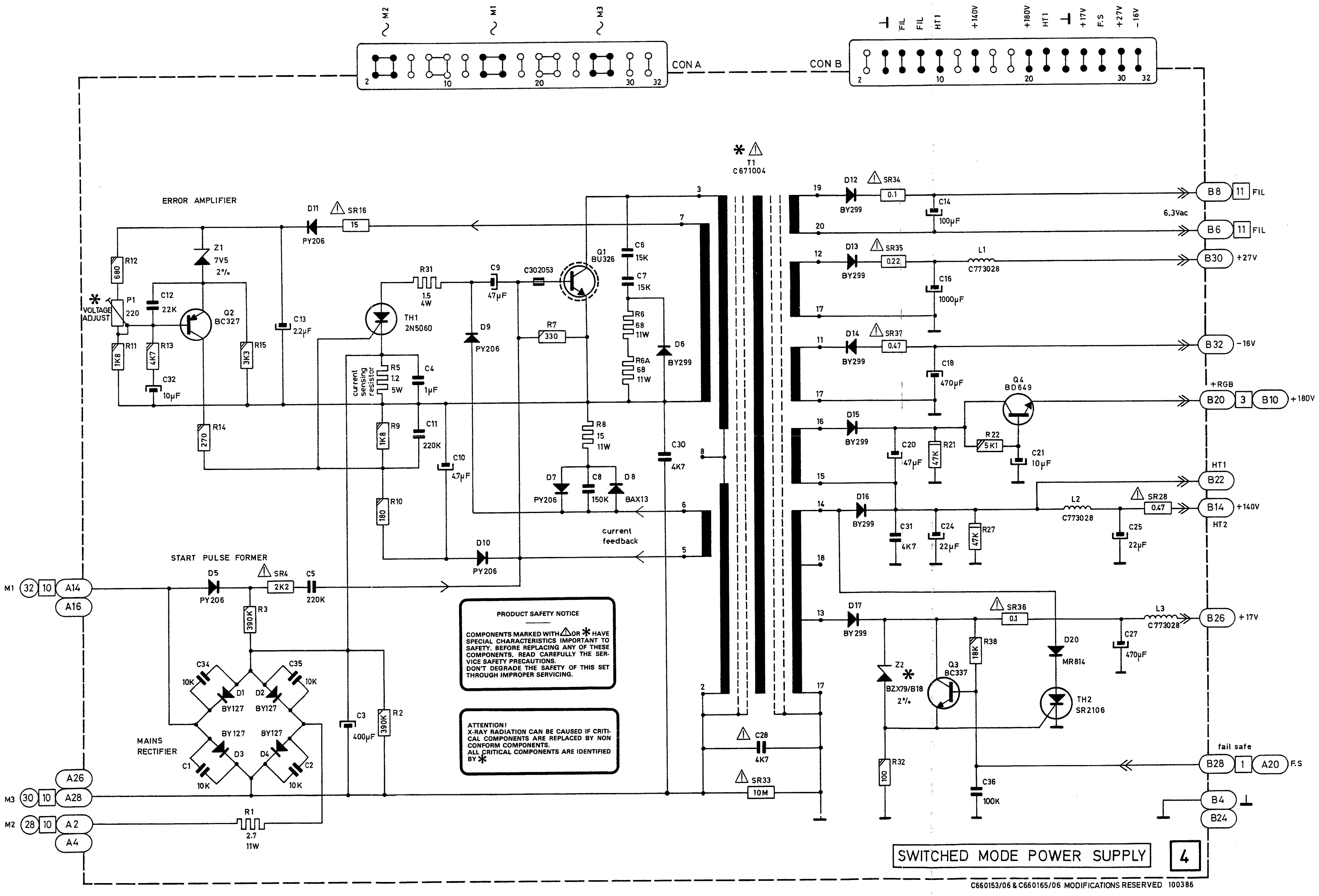
C660164/11 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 3
RGB OUT AMPLIFIER

Order number of a complete unit: C660164

Order number		Description	Item
C1011049	⚠	RRCFF 2E2 J 0.30	R120
C101108		RRCF 4E7 J 0.25	R76 ,R77 ,R78
C101112		RRCF 10E J 0.25	R115
C1011169	⚠	RRCFF 22E J 0.30	R117,R118,R119,R121,R122
C101119		RRCF 39E J 0.25	R67 ,R68 ,R69
C101120		RRCF 47E J 0.25	R61 ,R62 ,R63
C101122		RRCF 68E J 0.25	R64 ,R65 ,R66
C101124		RRCF 100E J 0.25	R1 ,R2 ,R3 ,R10 ,R11 ,R12 , R13 ,R14 ,R15 ,R25 ,R26 , R27 ,R37 ,R38 ,R39, R43, R44 ,R45 ,R58 ,R59 ,R60 , R87 ,R90 ,R93 ,R104,R116
C101126		RRCF 150E J 0.25	R34 ,R35 ,R36 ,R86 ,R89 ,R92
C101128		RRCF 220E J 0.25	R113
C101132		RRCF 470E J 0.25	R4 ,R5 ,R6 ,R7 ,R8 ,R9 , R123,R124,R125
C101133		RRCF 560E J 0.25	R55 ,R56 ,R57
C101134		RRCF 680E J 0.25	R84 ,R85
C101136		RRCF 1K J 0.25	R19 ,R20 ,R21
C101137		RRCF 1K2 J 0.25	R79 ,R80 ,R81
C101140		RRCF 2K2 J 0.25	R16 ,R17 ,R18 ,R28 ,R29 ,R30
C101142		RRCF 3K3 J 0.25	R108,R114
C101144		RRCF 4K7 J 0.25	R101
C101145		RCFF 5K6 J 0.25	R40 ,R41 ,R42 ,R88 ,R91 ,R94 , R96 ,R109
C101146		RRCF 6K8 J 0.25	R112
C101148		RRCF 10K J 0.25	R22 ,R23 ,R24 ,R31 ,R32 ,R33 , R49 ,R50 ,R51 ,R82 ,R83 ,R97 , R100,R106
C101149		RRCF 12K J 0.25	R52 ,R53 ,R54 ,R111
C101153		RRCF 27K J 0.25	R99
C101154		RRCF 33K J 0.25	R110
C101157		RRCF 56K J 0.25	R98
C101160		RRCF 100K J 0.25	R46 ,R47 ,R48 ,R107
C101233		RRCF 560E J 0.50	R95
C101248		RRCF 10K J 0.50	R102,R103
C103242		RRMO 3K3 J 1.50	R105
C103794		RRWW H 1K8 K 5.00	R70 ,R71 ,R72 ,R73 ,R74 ,R75
C1061041		RTCAM H 1K M 0.10	P2 ,P3
C1062041		RTCAPPV 1K M 0.20	P1
C1062071		RTCAPPV 10K M 0.20	P4 ,P5 ,P6
C1062121		RTCAPPV220K M 0.20	P10
C107527		RMCEM H 10K K 0.50	P7 ,P8 ,P9
V111159		CELAX 47M T 25	C60
C1111851		CELAX 10M Z 40	
V1112449		CELAX 4M7 M 250	C45
C111261		CELAX 2M2 T 350	C34 ,C35 ,C36 ,C49 ,C50 ,C56
V1114655		CELPR 47M Z 16	C13 ,C14 ,C15 ,C53
V1114789		CELPR 220M M 25	C51
V112235		CNPO MI 27P G5 63	C41
V112236		CNPO MI 33P G5 63	C1 ,C2 ,C3
V112238		CNPO MI 47P G5 63	C40
V112241		CNPO MI 82P G5 63	C43
V112366		CN750MI220P G5 63	C42
V112367		CN750MI270P G5 63	C44
V112737		CCE MI680P K5 63	C22 ,C24
C112738		CCE MI820P K5 63	C23
C112774		CCE MI100K S5 63	C10 ,C11 ,C12 ,C19 ,C20 ,C21 ,C52 C54 ,C57 ,C58 ,C59 ,C7 ,C8 ,C9
V114091		CPOMEP0330K K5 50	C16 ,C17 ,C18 ,C47
V114096		CPOMEPO 1M K5 50	C4 ,C5 ,C6
C114132		CPOMEFF100K K 250	C31 ,C32 ,C33 ,C37 ,C38 ,C39 ,C55
C115158		CPP PO560P J5 63	C25 ,C26 ,C27
V116321		CPP PR 100P H 630	C48
V117018		CFDTRV 18/300P 100	C28 ,C29 ,C30
V131257		TUBNEO STAB 103V	Z5
V131411		SMCTRA BC 549 C	Q1 ,Q13 ,Q14 ,Q15 ,Q2 ,Q27 ,Q28 Q29 ,Q3 ,Q4 ,Q5 ,Q6 ,Q7 ,Q8 Q9
V1314182		SMCTRA BC 559 C	Q16 ,Q17 ,Q18
C131446		SMCTRA BSX 29	Q10 ,Q11 ,Q12
V131471		SMCTRA BF 458	Q19 ,Q20 ,Q21 ,Q31 ,Q34
C131491		SMCTRA 2N2369	Q25 ,Q26 ,Q30
V131621		SMCDIO BAX 13	D4 ,D5 ,D6 ,D7 ,D11 ,D12 , D13 ,D14 ,D15 ,D18
V131622		SMCDIO BAX 16	D16 ,D17
V131627		SMCDIO BAV 21	D1 ,D2 ,D3
V131743		SMCDIOZEN 0.5W C8.2	Z1 ,Z2
V131751		SMCDIOZEN 0.5W C9V1	Z3
C131910		SMCDIO PY 207	D10 ,D8 ,D9
V1321025		SMCICLVOL ZTK 33 B	Z4
V132516		SMCTRA BF 422	Q32
V132538		SMCTRA 2N2219 A	Q22 ,Q23 ,Q24
V132552		SMCTRA BF 423	Q33
V133005		SMCTRA ISO PL T0220	FOR IC2
V1330135		SMCTRAFIX 5MM TO 5	FOR IC2
C133052		SMCTRA COOLER T0220	FOR IC2
C134002		SMCICLVOL LM 340T12	IC2
C134016		SMCICLVOL LM 320T12	IC3
V137394		SMCICD 4093 B	IC1
C313590		CON MOB SE AU C P32	32 PINS CONNECTOR
V315311		CON MOB L9 D1.3 P 1	
C605104		PC RGB OUT AMPL.CD351	PRINTED CIRCUIT BOARD
V7168551		HEATSINK VID. AMPL.	
V7290351		PCB GRIP UNIVERSAL	
V750443		TRANSISTORCLIPS	
V775219		SPO CHOHE RGCD	L4 ,L5 ,L6

R	12,11	13		14		1,15.3		4				16	5.9.10,2		31			7			6,6A			33	32.34,35,37		21,	22,27,38	36			28
C		12,32	34,1				35,2		13 5		3			4	11	10	9		8		6,7		30	28		20.31	14.16,18.24	36	21		25,27	
MISC.	P1				Z1,Q2,D5,D1,D3,D2,D4					D11			TH1				D9,D10	C302053,D7	Q1	D8		D6		T1	D12,D13,D14,D15,D16,D17,Z2		Q3	L1, Q4,		D20,TH2,L2		L3



M2
M1
M3
CON A
CON B
2
10
20
30
32
FIL
FIL
HT1
+140V
+180V
HT1
+17V
F.S
+27V
-16V
ERROR AMPLIFIER
D11
SR16
15
PY206
R12
680
Z1
7V5
2%
*
VOLTAGE ADJUST
P1
220
C12
22K
Q2
BC327
R11
1K8
R13
4K7
C32
10µF
R15
3K3
C13
2,2µF
R14
270
R31
1.5
4W
C9
47µF
C302053
Q1
BU326
C6
15K
C7
15K
TH1
2N5060
current sensing resistor
R5
1.2
5W
C4
1µF
D9
PY206
R7
330
R6
68
11W
R6A
68
11W
D6
BY299
R9
1K8
C11
220K
C10
47µF
R8
15
11W
D7
C8
D8
PY206
150K
BAX13
C30
4K7
R10
180
current feedback
D10
PY206
START PULSE FORMER
D5
PY206
SR4
2K2
C5
220K
R3
390K
C34
10K
C35
10K
D1
D2
BY127
BY127
BY127
BY127
D3
D4
MAINS RECTIFIER
C1
10K
C2
10K
C3
400µF
R2
390K
R1
2.7
11W
M1
32
10
A14
A16
A26
M3
30
10
A28
M2
28
10
A2
A4
*
T1
C671004
3
7
8
6
5
2
19
20
12
17
11
17
16
15
14
18
13
17
C28
4K7
SR33
10M
D12
SR34
0.1
BY299
C14
100µF
6,3Vac
D13
SR35
0.22
BY299
L1
C773028
C16
1000µF
D14
SR37
0.47
BY299
C18
470µF
Q4
BD649
D15
BY299
C20
47µF
R21
47K
R22
5K1
C21
10µF
D16
BY299
C31
4K7
C24
22µF
R27
47K
L2
C773028
SR28
0.47
C25
22µF
D17
BY299
SR36
0.1
L3
C773028
C27
470µF
Z2
BZX79/B18
2%
Q3
BC337
R38
18K
D20
MR814
TH2
SR2106
R32
100
C36
100K
B8
11
FIL
B6
11
FIL
B30
+27V
B32
-16V
+RGB
B20
3
B10
+180V
HT1
B22
B14
+140V
HT2
B26
+17V
fail safe
B28
1
A20
F.S
B4
B24

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR * HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

ATTENTION!
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ALL CRITICAL COMPONENTS ARE IDENTIFIED BY *

SWITCHED MODE POWER SUPPLY

4

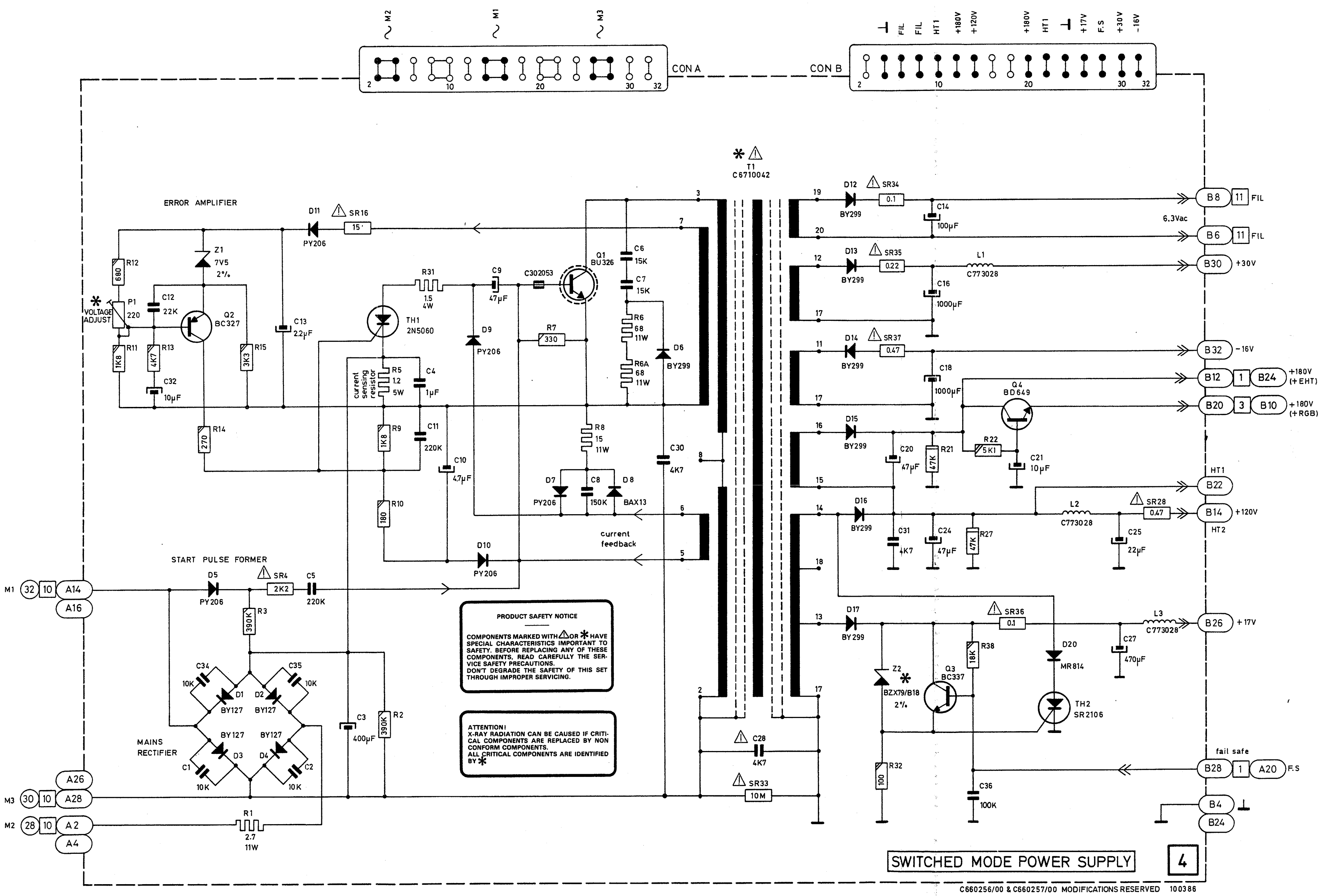
C660153/06 & C660165/06 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 4
SWITCHED MODE POWER SUPPLY

Order number of a complete unit: C660153 and C660165 (difference is C28)

Order number		Description	Item
C1011149	⚠	RRCFF 15E J 0.30	R16
C101124		RRCF 100E J 0.25	R32
C101127		RRCF 180E J 0.25	R10
C101129		RRCF 270E J 0.25	R14
C1011342		RRCF 680E G 0.20	R12
C101139		RRCF 1K8 J 0.25	R9
C1011392		RRCF 1K8 G 0.20	R11
C101142		RRCF 3K3 J 0.25	R15
C101144		RRCF 4K7 J 0.25	R13
V1011446	⚠	RRCFF 5K1 J 0.30	R22
C101151		RRCF 18K J 0.25	R38
C1011917	⚠	RRCFF E22K 0.40	R35
C1011947	⚠	RRCFF E47K 0.40	R28 ,R37
V1011998	⚠	RRCFF E1 K 0.40	R36
C101230		RRCF 330E J 0.50	R7
C1012409	⚠	RRCFF 2K2 J 0.50	R4
C101267		RRCF 390K J 0.50	R2 ,R3
V1012998	⚠	RRCFF E1 K 0.50	R34
C103256		RRMO 47K J 1.50	R21 ,R27
V103614		RRWW H 1E5 K 4.00	R31
C103725		RRWW H 1E2 J 5.00	R5
C104406		RRWW V 2E7 K11.00	R1
C104415		RRWW V 15E K11.00	R8
C104423		RRWW V 68E K11.00	R6 ,R6A
C1046781		RRHV 10M J 1.00	R33
C1062022	*	RTCASCV220E M 0.15	P1
V111156		CELAX 10M Z 25	C32
C111184		CELAX 4M7 Z 40	C10
V111196		CELAX 2M2 Z 63	C13
C1113719		CELPR 1000M M 40	C16
C1113889		CELPR 47M M 100	C9
C1113999		CELPR 47M M 160	C20
V1114169		CELPR 10M M 350	C21
C1114189		CELPR 22M M 350	C24 ,C25
V1114799		CELPR 470M M 25	C18 ,C27
V1114879		CELPR 100M M 35	C14
C111655		CELRA 400M T 385	C3
C112774		CCE MI100K S5 63	C36
V112833		CCE DI 4K7 S 400	C30 ,C31
C1128338	⚠	CCEUILDI 4K7 125	C28 IF UNIT C660165
C112837		CCE DI 10K S 400	C1 ,C2 ,C34 ,C35
C114101		CPOMEFF150K K 100	C8
C114102		CPOMEFF220K K 100	C11
C114106		CPOMEFF 1M K 100	C4
V114124		CPOMEFF 22K K 250	C12
C114166		CPOMEFF220K K 400	C5
C114451		CPO FF 15K K 400	C6 ,C7
C1147009	⚠	CCESADI 4K7 MAC400	C28 IF UNIT C660153
V131426		SMCTRA BC 337	Q3
C131472		SMCTRA BU 326 A	Q1
V131621		SMCDIO BAX 13	D8
V1317562		SMCDIOZEN 0.5W B7.5	Z1
C131766	*	SMCDIOZEN 0.5W C 18	Z2
C131902		SMCDIOREC BY 127	D1 ,D2 ,D3 ,D4
C131911		SMCDIOREC PY 206	D10 ,D11 ,D20 ,D5 ,D7 ,D9
V131921		SMCDIOREC BY 299	D12 ,D13 ,D14 ,D15 ,D16 ,D17 ,D6
C1322075		SMCTHY TAG E0102	TH1
C132210		SMCTHY C 106 C	TH2
V132501		SMCTRA BC 327-25	Q2
V132577		SMCTRAPOW BD 649	Q4
V133031		SMCTRA ISO PL TO 3	
V302126		CORE CHO 3/6 X18	
C313224		RRWW V HOLDER H25	
C313590		CON MOB SE AU C P32	32 PINS CONNECTOR
V315331		SOLDERLUG1 D3.2 L12	
C605097		PC POWERSUPPLYCD351	PRINTED CIRCUIT BOARD
V6710042	* ⚠	TRF SM POWER SUPPLY	T1
C712552		COOLERSMPOWERSUPPLY	FOR Q1
V729125		ISOLATION TRA 02	
C773028		SPOCHOKE SMPOWER 31	L1 ,L2 ,L3

R	12,11 13 14 1,15.3 4 16 5.9.10,2 31 7 6.6A 33 32.34,35,37 21, 22,27,38 36 28
C	12,32 34,1 35,2 13 5 3 4 11 10 9 8 6,7 30 28 20.31 14.16,18.24 36 21 25,27
MISC.	P1 Z1,Q2,D5,D1,D3.D2,D4 D11 TH1 D9,D10 C302053,D7 Q1 D8 D6 T1 D12,D13,D14,D15,D16,D17,Z2 Q3 L1, Q4, D20.TH2.L2 L3


M2
M1
M3
CON A
CON B
2
10
20
30
32
FIL
FIL
HT1
+180V
+120V
+180V
HT1
+17V
F.S
+30V
-16V
ERROR AMPLIFIER
D11
SR16
15
PY206
R12
680
P1
220
VOLTAGE ADJUST
R11
1K8
Z1
7V5
2%
C12
22K
Q2
BC327
R13
4K7
C32
10μF
R15
3K3
C13
2.2μF
R14
270
R31
1.5
4W
TH1
2N5060
current sensing resistor
R5
1.2
5W
C4
1μF
R9
1K8
C11
220K
C10
4.7μF
R10
180
C9
47μF
C302053
D9
PY206
R7
330
Q1
BU326
C6
15K
C7
15K
R6
68
11W
R6A
68
11W
D6
BY299
R8
15
11W
D7
PY206
C8
150K
D8
BAX13
C30
4K7
current feedback
D10
PY206
START PULSE FORMER
D5
PY206
SR4
2K2
C5
220K
R3
390K
C34
10K
C35
10K
D1
BY127
D2
BY127
D3
BY127
D4
BY127
MAINS RECTIFIER
C1
10K
C2
10K
C3
400μF
R2
390K
R1
2.7
11W
M1
32
10
A14
A16
A26
M3
30
10
A28
M2
28
10
A2
A4
T1
C6710042
3
7
8
6
5
2
19
20
12
17
11
17
16
15
14
18
13
17
D12
BY299
SR34
0.1
C14
100μF
6.3Vac
B8
11
FIL
B6
11
FIL
D13
BY299
SR35
0.22
C16
1000μF
L1
C773028
B30
+30V
D14
BY299
SR37
0.47
C18
1000μF
B32
-16V
Q4
BD649
B12
1
B24
+180V
(+EHT)
B20
3
B10
+180V
(+RGB)
D15
BY299
C20
47μF
R21
47K
R22
5K1
C21
10μF
HT1
B22
D16
BY299
C31
4K7
C24
47μF
R27
47K
L2
C773028
C25
22μF
SR28
0.47
B14
+120V
HT2
D17
BY299
SR36
0.1
L3
C773028
B26
+17V
Z2
BZX79/B18
2%
Q3
BC337
R38
18K
D20
MR814
TH2
SR2106
C27
470μF
C28
4K7
SR33
10M
R32
100
C36
100K
fail safe
B28
1
A20
F.S
B4
B24

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SWITCHED MODE POWER SUPPLY

4

C660256/00 & C660257/00 MODIFICATIONS RESERVED 100386

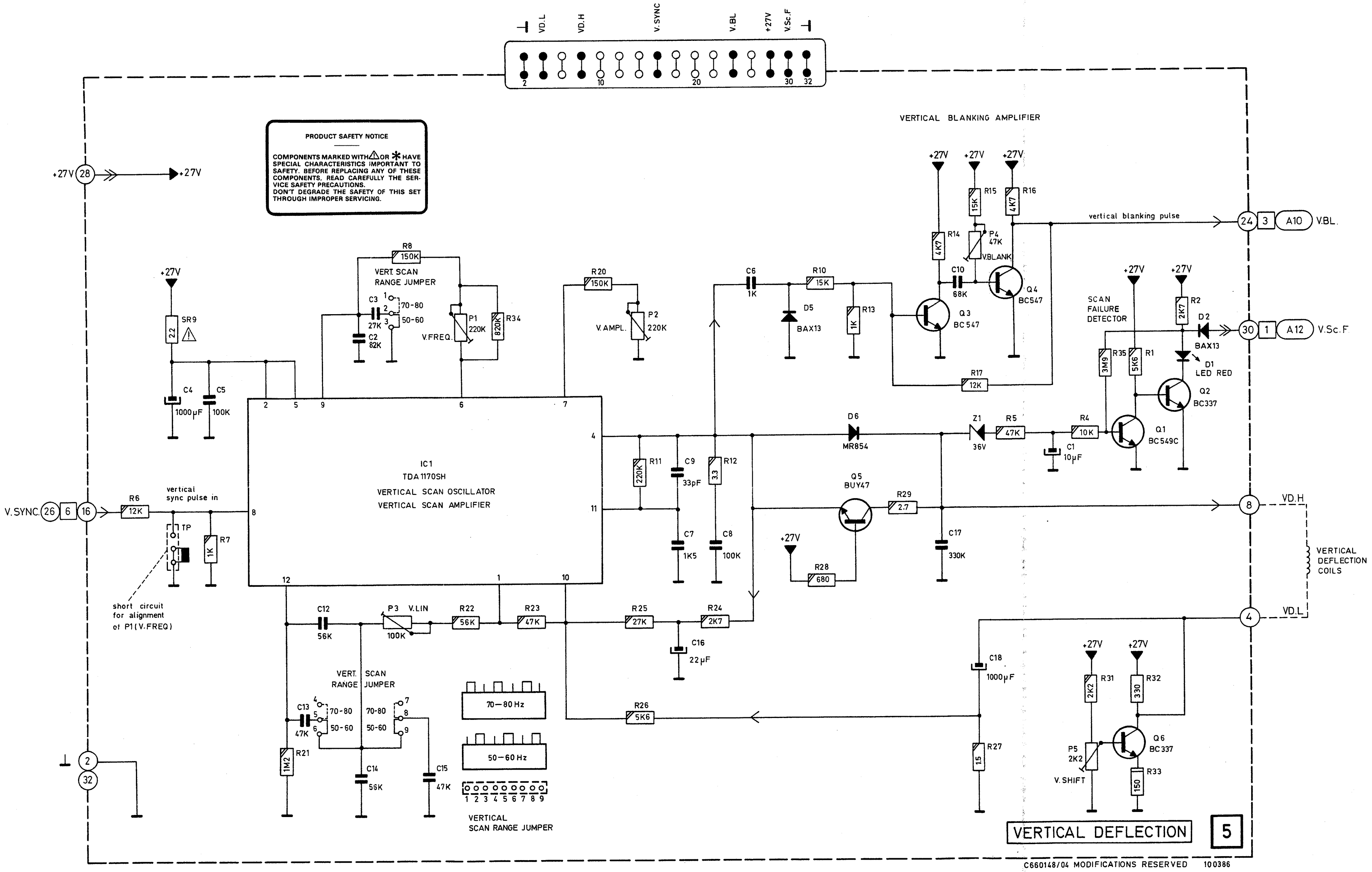
PARTS LIST OF UNIT 4

SWITCHED MODE POWER SUPPLY

Order number of a complete unit: C660256 and C660257 (difference is C28)

Order number		Description	Item
C1011149	⚠	RRCFF 15E J 0.30	R16
C101124		RRCF 100E J 0.25	R32
C101127		RRCF 180E J 0.25	R10
C101129		RRCF 270E J 0.25	R14
C1011342		RRCF 680E G 0.20	R12
C101139		RRCF 1K8 J 0.25	R9
C1011392		RRCF 1K8 G 0.20	R11
C101142		RRCF 3K3 J 0.25	R15
C101144		RRCF 4K7 J 0.25	R13
V1011446	⚠	RRCFF 5K1 J 0.30	R22
C101151		RRCF 18K J 0.25	R38
C1011917	⚠	RRCFF E22K 0.40	R35
C1011947	⚠	RRCFF E47K 0.40	R28 ,R37
V1011998	⚠	RRCFF E1 K 0.40	R36
C101230		RRCF 330E J 0.50	R7
C1012409	⚠	RRCFF 2K2 J 0.50	R4
C101267		RRCF 390K J 0.50	R2 ,R3
V1012998	⚠	RRCFF E1 K 0.50	R34
C103256		RRMO 47K J 1.50	R21 ,R27
V103614		RRWW H 1E5 K 4.00	R31
C103725		RRWW H 1E2 J 5.00	R5
C104406		RRWW V 2E7 K11.00	R1
C104415		RRWW V 15E K11.00	R8
C104423		RRWW V 68E K11.00	R6 ,R6A
C1046781		RRHV 10M J 1.00	R33
C1062022	*	RTCASCV220E M 0.15	P1
V111156		CELAX 10M Z 25	C32
C111184		CELAX 4M7 Z 40	C10
V111196		CELAX 2M2 Z 63	C13
C1113719		CELPR 1000M M 40	C16 ,C18
C1113889		CELPR 47M M 100	C9
C1113999		CELPR 47M M 160	C20 ,C24
V1114169		CELPR 10M M 350	C21
C1114189		CELPR 22M M 350	C25
V1114799		CELPR 470M M 25	C27
V1114879		CELPR 100M M 35	C14
C111655		CELRA 400M T 385	C3
C112774		CCE MI100K S5 63	C36
V112833		CCE DI 4K7 S 400	C30 ,C31
C1128338	⚠	CCEULDI 4K7 S 125	C28 IF UNIT C660257
C112837		CCE DI 10K S 400	C1 ,C2 ,C34 ,C35
C114101		CPOMEFF150K K 100	C8
C114102		CPOMEFF220K K 100	C11
C114106		CPOMEFF 1M K 100	C4
V114124		CPOMEFF 22K K 250	C12
C114166		CPOMEFF220K K 400	C5
C114451		CPO FF 15K K 400	C6 ,C7
C1147009	⚠	CCESADI 4K7 MAC400	C28 IF UNIT C660256
V131426		SMCTRA BC 337	Q3
C131472		SMCTRA BU 326 A	Q1
V131621		SMCDIO BAX 13	D8
V1317562		SMCDIOZEN 0.5W B7.5	Z1
C131766	*	SMCDIOZEN 0.5W C 18	Z2
C131902		SMCDIOREC BY 127	D1 ,D2 ,D3 ,D4
C131911		SMCDIOREC PY 206	D10 ,D11 ,D20 ,D5 ,D7 ,D9
V131921		SMCDIOREC BY 299	D12 ,D13 ,D14 ,D15 ,D16 ,D17 ,D6
C1322075		SMCTHY TAG E0102	TH1
C132210		SMCTHY C 106 C	TH2
V132501		SMCTRA BC 327-25	Q2
V132577		SMCTRAPOW BD 649	Q4
V133031		SMCTRA ISO PL TO 3	
V302126		CORE CHO 3/6 X18	
C313224		RRWW V HOLDER H25	
C313590		CON MOB SE AU C P32	32 PINS CONNECTOR
V315331		SOLDERLUG1 D3.2 L12	
C605097		PC POWER SUPPLY CD35	PRINTED CIRCUIT BOARD
V6710041	* ⚠	TRF SM POWER 2 CD351	T1
C712552		COOLER SM POWER SUPPLY	FOR Q1
V7290351		PCB GRIP UNIVERSAL	
V729125		ISOLATION TRA 02	
C773028		SPOCHOKE SMPOWER 31	L1 ,L2 ,L3

R	6	9	7	21				8		22		34,23	20	11.25,26,		12,24,			10,28	13	29	14	15,17, 27,		16, 5.		4 . 31,35.		1.32,33.	2
C		4	5	13	12	2,14,3,			15						9,7,16,	8	6					17, 10.	18			1				
MISC.							P3,	IC1			P1			P2				D5		D6, Q5		Q3	Z1	P4	Q4		P5	Q1		Q6,Q2,D1, D2



VD.L
VD.H
V.SYNC
V.BL
+27V
V.Sc.F
2
10
20
30
32
+27V 28
+27V
V.SYNC 26 6 16
R6
12K
vertical
sync pulse in
TP
R7
1K
short circuit
for alignment
of P1 (V.FREQ)
SR9
2.2
C4
1000 μF
C5
100K
R8
150K
VERT. SCAN
RANGE JUMPER
C3
27K
70-80
50-60
C2
82K
P1
220K
V.FREQ.
R34
820K
R20
150K
P2
220K
V.AMPL.
IC1
TDA 1170SH
VERTICAL SCAN OSCILLATOR
VERTICAL SCAN AMPLIFIER
C6
1K
D5
BAX13
R10
15K
R13
1K
R11
220K
C9
33pF
R12
3.3
C7
1K5
C8
100K
VERTICAL BLANKING AMPLIFIER
R14
4K7
R15
15K
P4
47K
V.BLANK
R16
4K7
C10
68K
Q3
BC 547
Q4
BC547
R17
12K
vertical blanking pulse
24 3 A10 V.BL.
SCAN
FAILURE
DETECTOR
R2
2K7
D2
BAX13
30 1 A12 V.Sc.F
R35
3M9
R1
5K6
D1
LED RED
Q2
BC337
Q1
BC549C
R4
10K
C1
10μF
R5
47K
Z1
36V
D6
MR854
Q5
BUY47
R28
680
R29
2.7
C17
330K
8 VD.H
VERTICAL
DEFLECTION
COILS
4 VD.L
C12
56K
P3 V.LIN
100K
R22
56K
R23
47K
R25
27K
R24
2K7
C16
22 μF
R26
5K6
C18
1000 μF
R27
15
VERT. SCAN
RANGE JUMPER
C13
47K
70-80
50-60
R21
1M2
C14
56K
C15
47K
70—80 Hz
50—60 Hz
1 2 3 4 5 6 7 8 9
VERTICAL
SCAN RANGE JUMPER
R31
2K2
R32
330
P5
2K2
V. SHIFT
Q6
BC 337
R33
150
2
32
VERTICAL DEFLECTION
5

PRODUCT SAFETY NOTICE

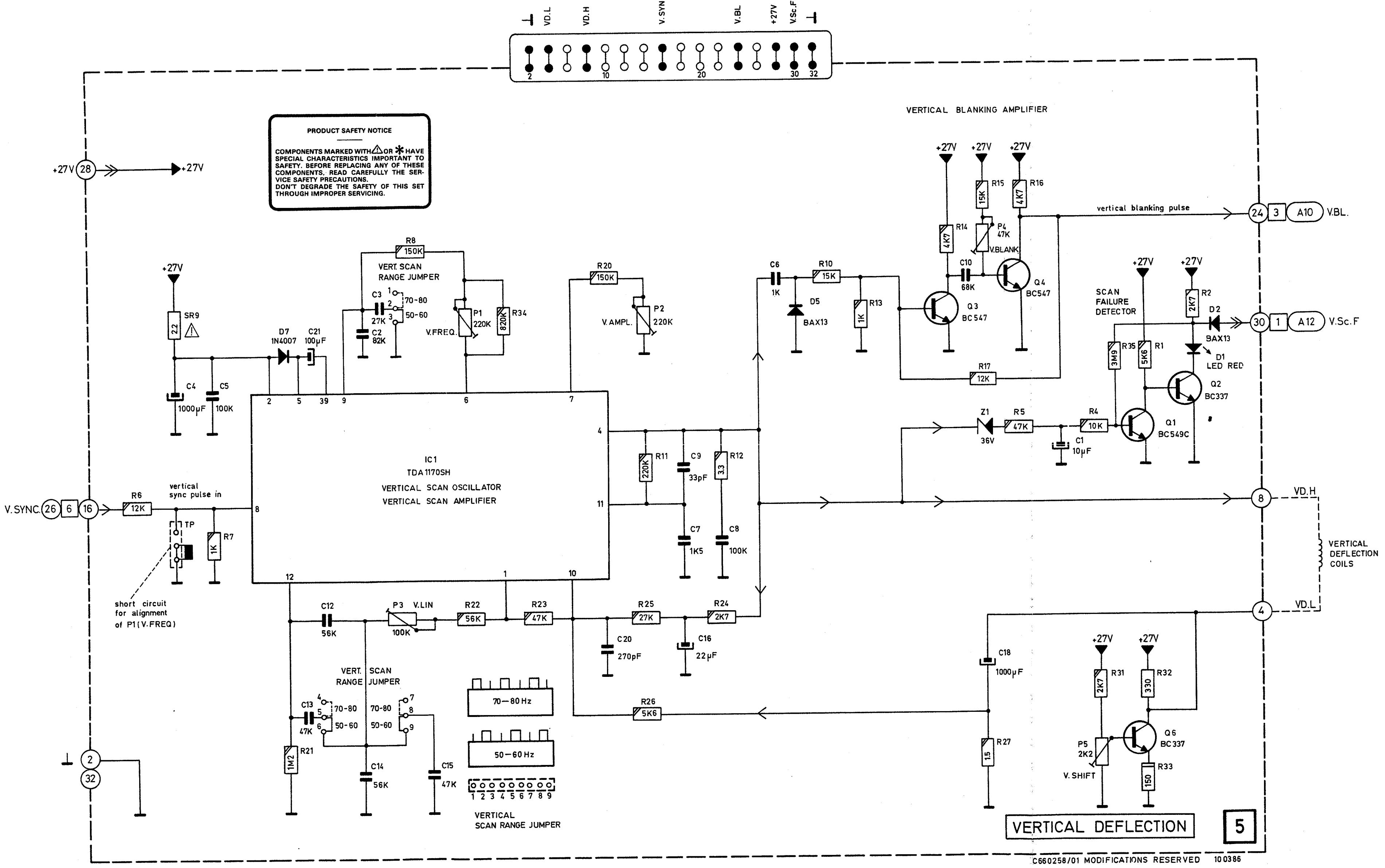
COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

C660148/04 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 5
VERTICAL DEFLECTION
Order number of a complete unit: C660148

Order number	Description	Item
C101102	RRCF 1E5 J 0.25	R27
C1011049 ⚠	RRCFF 2E2 J 0.30	R9
V101105	RRCF 2E7 J 0.25	R29
C101106	RRCF 3E3 J 0.25	R12
V101134	RRCF 680E J 0.25	R28
V101145	RRCF 5K6 J 0.25	R1 ,R26
V101149	RRCF 12K J 0.25	R17 ,R6
V101150	RRCF 15K J 0.25	R10 ,R15
V101153	RRCF 27K J 0.25	R25
V101157	RRCF 56K J 0.25	R22
V101162	RRCF 150K J 0.25	R20 ,R8
V101171	RRCF 820K J 0.25	R34
C101173	RRCF 1M2 K 0.25	R21
C101179	RRCF 3M9 K 0.25	R35
V101236	RRMF 1K J 0.50	R13 ,R7
V101240	RRMF 2K2 J 0.50	R31
C101241	RRCF 2K7 J 0.50	R2
V101241	RRMF 2K7 J 0.50	R24
V101244	RRMF 4K7 J 0.50	R14 ,R16
V101248	RRMF 10K J 0.50	R4
V101256	RRMF 47K J 0.50	R23 ,R5
V101264	RRMF 220K J 0.50	R11
C101330	RRCF 330E J 1.00	R32
V102926	RRMF 150E J 1.60	R33
C1062051	RTCAPPV 2K2 M 0.20	P5
C1062091	RTCAPPV 47K M 0.20	P4
C1062111	RTCAPPV100K M 0.20	P3
C1062121	RTCAPPV220K M 0.20	P1 ,P2
V111157	CELAX 22M Z 25	C16
C1111851	CELAX 10M Z 40	C1
C1113719	CELPR 1000M M 40	C18 ,C4
V112236	CNPO MI 33P G5 63	C9
V112367	CN750MI270P G5 63	C20
V112739	CCE MI 1K K5 63	C6
C112741	CCE MI 1K5 K5 63	C7
C112774	CCE MI100K S5 63	C5 ,C8
V114038	CPOMEPO 47K K 250	C13 ,C15
V114039	CPOMEPO 56K K 250	C12 ,C14
V114041	CPOMEPO 82K K 250	C2
C114125	CPOMEFF 27K K 250	C3
V114130	CPOMEFF 68K K 250	C10
V114138	CPOMEFF330K K 250	C17
C131407	SMCTRA BC 547	Q3 ,Q4
V131411	SMCTRA BC 549 C	Q1
V131426	SMCTRA BC 337	Q2 ,Q6
V131621	SMCDIO BAX 13	D5
C131664	SMCDIOLED 5MM RED	D1
V131777	SMCDIOZEN 0.5W C 36	Z1
V131940	SMCDIOREC MR 854	D6
C1321642	SMCICL TDA1170SH	IC1
V132551	SMCTRA BUY 47	Q5
V1330135	SMCTRAFIX 5MM TO 5	
C133069	HEATSINK POWER IC	FOR IC1
C313276	CON MOB TE 2.54 P10	SCAN RANGE CONVERTER
C313590	CON MOB SE AU C P32	32 PINS CONNECTOR
C313635	CON FOB TE MODU P 9	SCAN RANGE JUMPER
C605098	PC VERT DEFL. CD351	PRINTED CIRCUIT BOARD
V7290351	PCB GRIP UNIVERSAL	

R	6	9	7	21				8		22		34,23	20	11,25,26,		12,24,			10,	13	14		15,17,27,		16,5.		4.31,35,	1,32,33.	2
C		4	5	13	12,21	2,14,3,			15				20		9,7,16,	8	6					10.	18			1			
MISC.				D7			P3,	IC1			P1			P2				D5			Q3		Z1	P4	Q4		P5	Q1	Q6,Q2,D1, D2



VD.L
VD.H
V.SYNC
V.BL
+27V
V.Sc.F
2
10
20
30
32
VERTICAL BLANKING AMPLIFIER
+27V 28
+27V
V.SYNC 26 6 16
R6 12K
vertical sync pulse in
TP
R7 1K
short circuit for alignment of P1(V.FREQ)
2 32
SR9 22
C4 1000μF
C5 100K
D7 1N4007
C21 100μF
R8 150K
VERT. SCAN RANGE JUMPER
C3 27K
C2 82K
70-80
50-60
P1 220K
V.FREQ.
R34 820K
R20 150K
V.AMPL.
P2 220K
IC1
TDA 1170SH
VERTICAL SCAN OSCILLATOR
VERTICAL SCAN AMPLIFIER
R11 220K
C9 33pF
R12 33
C7 1K5
C8 100K
C12 56K
P3 V.LIN 100K
R22 56K
R23 47K
R25 27K
R24 2K7
C20 270pF
C16 22μF
R26 5K6
VERT. SCAN RANGE JUMPER
C13 47K
R21 1M2
C14 56K
C15 47K
70-80 Hz
50-60 Hz
1 2 3 4 5 6 7 8 9
VERTICAL SCAN RANGE JUMPER
C6 1K
D5 BAX13
R10 15K
R13 1K
R14 4K7
R15 15K
R16 4K7
P4 47K V.BLANK
C10 68K
Q3 BC547
Q4 BC547
R17 12K
vertical blanking pulse
24 3 A10 V.BL.
SCAN FAILURE DETECTOR
R2 2K7
D2 BAX13
30 1 A12 V.Sc.F
D1 LED RED
R35 3M9
R1 5K6
Q2 BC337
Z1 36V
R5 47K
R4 10K
C1 10μF
Q1 BC549C
8 VD.H
VERTICAL DEFLECTION COILS
4 VD.L
C18 1000μF
R27 1.5
R31 2K7
R32 330
P5 2K2 V.SHIFT
Q6 BC337
R33 150

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR * HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

VERTICAL DEFLECTION

5

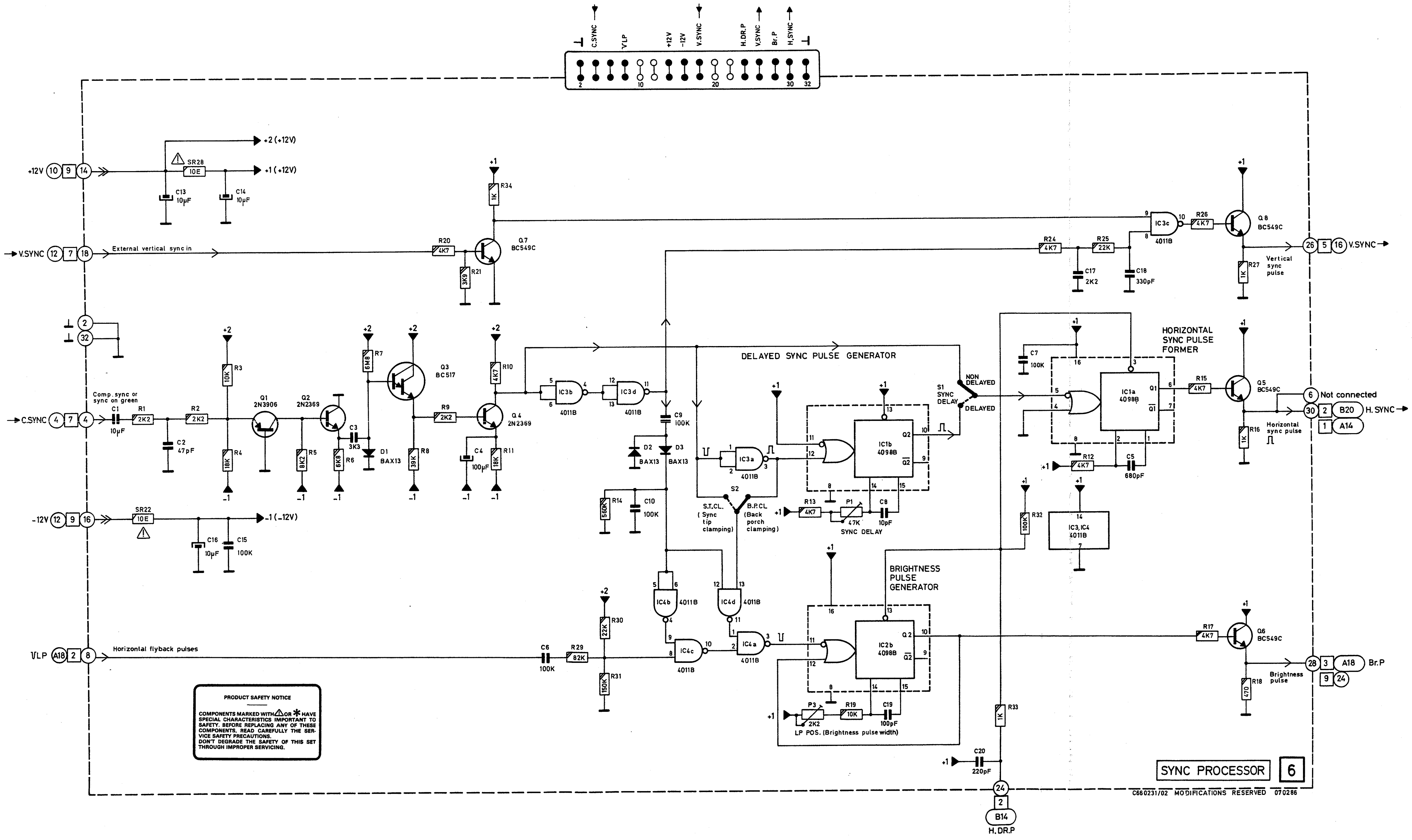
C660258/01 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT 5
VERTICAL DEFLECTION

Order number of a complete unit: C660258

Order number	Description	Item
C101102	RRCF 1E5 J 0.25	R27
C1011049	⚠ RRCFF 2E2 J 0.30	R9
V101145	RRCF 5K6 J 0.25	R1 ,R26
V101149	RRCF 12K J 0.25	R17 ,R6
V101157	RRCF 56K J 0.25	R22
V101171	RRCF 820K J 0.25	R34
C101173	RRCF 1M2 K 0.25	R21
C101206	RRCF 3E3 J 0.25	R12
V101236	RRMF 1K J 0.50	R13 ,R7
C101241	RRMF 2K7 J 0.50	R2
V101241	RRMF 2K7 J 0.50	R24 ,R31
V101244	RRMF 4K7 J 0.50	R14 ,R16
V101248	RRMF 10K J 0.50	R4
V101250	RRMF 15K J 0.50	R10 ,R15
V101252	RRMF 22K J 0.50	R5
V101253	RRMF 27K J 0.50	R25
V101256	RRMF 47K J 0.50	R23
V101262	RRMF 150K J 0.50	R20 ,R8
V101264	RRMF 220K J 0.50	R11
V101279	RRMF 3M9 K 0.50	R35
C101330	RRCF 330E J 1.00	R32
V102926	RRMF 150E J 1.60	R33
C1062051	RTCAPPV 2K2 M 0.20	P5
C1062091	RTCAPPV 47K M 0.20	P4
C1062111	RTCAPPV100K M 0.20	P3
C1062121	RTCAPPV220K M 0.20	P1 ,P2
V111157	CELAX 22M Z 25	C16
C1111851	CELAX 10M Z 40	C1
C111190	CELAX 100M T 40	C21
C1113719	CELPR 1000M M 40	C18 ,C4
V1114149	CELPR 1M M 160	C8
V112236	CNPO MI 33P G5 63	C9
V112367	CN750MI270P G5 63	C20
V112739	CCE MI 1K K5 63	C6
C112741	CCE MI 1K5 K5 63	C7
C112774	CCE MI100K S5 63	C5
V114038	CPOMEPO 47K K 250	C13 ,C15
V114039	CPOMEPO 56K K 250	C12 ,C14
V114041	CPOMEPO 82K K 250	C2
C114125	CPOMEFF 27K K 250	C3
V114130	CPOMEFF 68K K 250	C10
C131407	SMCTRA BC 547	Q3 ,Q4
V131411	SMCTRA BC 549 C	Q1
V131426	SMCTRA BC 337	Q2 ,Q6
V131621	SMCDIO BAX 13	D5
C131646	SMCDIOREC 1N4007	D7
C131664	SMCDIOLED 5MM RED	D1
V131777	SMCDIOZEN 0.5W C 36	Z1
V131940	SMCDIOREC MR 854	D6
C1321642	SMCICL TDA1170SH	IC1
V1330135	SMCTRAFIX 5MM TO 5	
C133069	HEATSINK POWER IC	FOR IC1
C313276	CON MOB TE 2.54 P10	SCAN RANGE CONVERTER
C313590	CON MOB SE AU C P32	32 PINS CONNECTOR
C313635	CON FOB TE MODU P 9	SCAN RANGE JUMPER
C605098	PC VERT DEFL. CD351	PRINTED CIRCUIT BOARD
V7290351	PCB GRIP UNIVERSAL	

R		1,22		28,2	3,4		5	6		7	8,9,20	21	34,10,11		29	14,30,31					13		19		33	32		24	12,	25		26,15,17,	27,16,18
C	1		2,13	16	14,15				3			4		6			10	9					8,19,	20			7		17		18,5,		
MISC.						Q1		Q2		D1	Q3		Q7,Q4				D2	D3	S2	P3		P1	IC1,IC2	S1					IC3,IC4				Q8,Q5,Q6


C.SYNC
V.LP
+12V
-12V
V.SYNC
H.DR.P
V.SYNC
Br.P
H.SYNC
2
10
20
30
32
+2 (+12V)
+1 (+12V)
SR28
10E
C13
10µF
C14
10µF
+12V
10
9
14
V.SYNC
12
7
18
External vertical sync in
2
32
Comp. sync or sync on green
C.SYNC
4
7
4
C1
10µF
R1
2K2
C2
47pF
R2
2K2
R3
10K
R4
18K
Q1
2N3906
Q2
2N2369
R5
8K2
R6
6K8
C3
3K3
D1
BAX13
R7
6M8
Q3
BC517
R8
39K
R9
2K2
Q4
2N2369
R10
4K7
R11
18K
C4
100µF
R20
4K7
R21
3K9
Q7
BC549C
R34
1K
-12V
12
9
16
SR22
10E
-1 (-12V)
C16
10µF
C15
100K
IC3b
4011B
IC3d
4011B
C9
100K
D2
BAX13
D3
BAX13
R14
560K
C10
100K
DELAYED SYNC PULSE GENERATOR
IC3a
4011B
S2
S.T.CL. (Sync tip clamping)
B.P.CL. (Back porch clamping)
IC1b
4098B
R13
4K7
P1
47K
C8
10pF
SYNC DELAY
S1
SYNC DELAY
NON DELAYED
DELAYED
IC3c
4011B
R26
4K7
R24
4K7
R25
22K
C17
2K2
C18
330pF
Q8
BC549C
R27
1K
Vertical sync pulse
26
5
16
V.SYNC
HORIZONTAL SYNC PULSE FORMER
C7
100K
IC1a
4098B
R12
4K7
C5
680pF
R15
4K7
Q5
BC549C
R16
1K
Horizontal sync pulse
6
Not connected
30
2
B20
H. SYNC
1
A14
R32
100K
14
IC3, IC4
4011B
7
BRIGHTNESS PULSE GENERATOR
IC4b
4011B
IC4d
4011B
IC4c
4011B
IC4a
4011B
R30
22K
R31
150K
C6
100K
R29
82K
V̄LP
A18
2
8
Horizontal flyback pulses
IC2b
4098B
P3
2K2
R19
10K
C19
100pF
LP POS. (Brightness pulse width)
R17
4K7
Q6
BC549C
R18
470
Brightness pulse
28
3
A18
Br.P
9
24
R33
1K
C20
220pF
24
2
B14
H.DR.P

PRODUCT SAFETY NOTICE

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DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

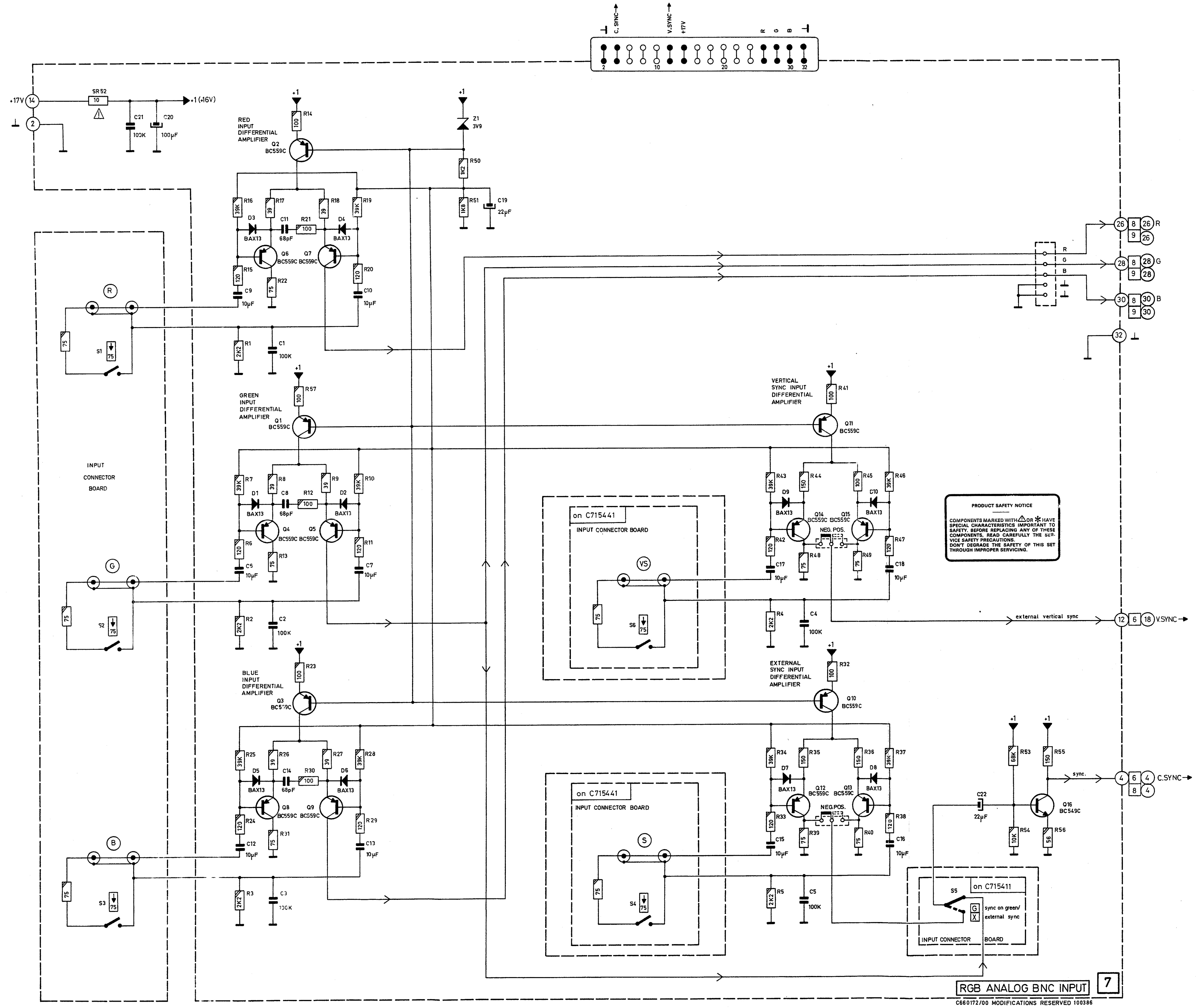
SYNC PROCESSOR 6

C660231/02 MODIFICATIONS RESERVED 070286

PARTS LIST OF UNIT 6
SYNC PROCESSOR
Order number of a complete unit: C660231

Order number	Description	Item
C1011129 ⚠	RRCFF 10E J 0.30	R22 ,R28
V101132	RRCF 470E J 0.25	R18
V101136	RRCF 1K J 0.25	R16 ,R27 ,R33 ,R34
V101140	RRCF 2K2 J 0.25	R1 ,R2 ,R9
V101143	RRCF 3K9 J 0.25	R21
V101144	RRCF 4K7 J 0.25	R10 ,R12 ,R13 ,R15 ,R17 ,R20 ,R24 R26
V101146	RRCF 6K8 J 0.25	R6
V101147	RRCF 8K2 J 0.25	R5
V101148	RRCF 10K J 0.25	R19 ,R3
V101151	RRCF 18K J 0.25	R11 ,R4
V101152	RRCF 22K J 0.25	R25 ,R30
V101155	RRCF 39K J 0.25	R8
V101159	RRCF 82K J 0.25	R29
V101160	RRCF 100K J 0.25	R32
V101162	RRCF 150K J 0.25	R31
V101169	RRCF 560K J 0.25	R14
C101182	RRCF 6M8 K 0.25	R7
V101182	RRCF 6M8 J 0.25	R7
C1062061	RTCAPPV 4K7 M 0.20	P3
C1062091	RTCAPPV 47K M 0.20	P1
V111156	CELAX 10M Z 25	C1 ,C13 ,C14 ,C16
C111190	CELAX 100M T 40	C4
V112230	CNPO MI 10P G5 63	C8
V112238	CNPO MI 47P G5 63	C2
V112242	CNPO MI100P G5 63	C19
V112366	CN750MI220P G5 63	C20
V112368	CN750MI330P G5 63	C18
V112737	CCE MI680P K5 63	C5
C112743	CCE MI 2K2 K5 63	C17
C112745	CCE MI 3K3 K5 63	C3
C112774	CCE MI100K S5 63	C15 ,C7
V1140422	CPOMEPO100K K 100	C10 ,C6 ,C9
V131411	SMCTRA BC 549 C	Q5 ,Q6 ,Q7 ,Q8
C131491	SMCTRA 2N2369	Q2 ,Q4
V131496	SMCTRA 2N3906	Q1
V131621	SMCDIO BAX 13	D1 ,D2 ,D3
V132575	SMCTRA BC 517	Q3
V137302	SMCICD 4011 B	IC3 ,IC4
C137395	SMCICD 4098 B	IC1 ,IC2
V313494	CON DIL RM 7.62 P14	
V313495	CON DIL RM 7.62 P16	
C313590	CON MOB SE AU C P32	
C324159	SWITCH SLIDE 2U	S1 ,S2
V605124	PCB SYNC PROCESS CD3	PRINTED CIRCUIT BOARD
V7290351	PCB GRIP UNIVERSAL	

R	52				16,15,1,7,6, 2 ,25, 24, 3,17,22, 8,13,26,31, 14,57, 23, 21,12,30, 18, 9,27, 19,20,10,11, 28,29		50,51,		43. 42. 4. 34,33.5, 48,44, 35,39,	41. 32. 45.49.36.40.	46,47.38.37.		53.54	55.56
C		21	20	9,6,12	1, 2, 3, 11, 8, 14,	10. 7, 13,	19		17.15 4,5		18,16	22		
MISC.	S1, S2, S3				D3,D1,D5,Q6,Q4,Q8,Q2,Q1,Q3,Q7,Q5,Q9,D4,D2,D6		Z1	S6, S4	D9,D7,Q14,Q12.	Q11.Q10. Q15.Q13.	D10.D8.	S5		Q16



⊥
C. SYNC
V. SYNC
+17V
R
G
B
2
10
20
30
32
+17V
14
2
SR52
10
C21
100K
C20
100μF
+1 (16V)
+1
R14
100
RED INPUT DIFFERENTIAL AMPLIFIER
Q2
BC559C
Z1
3V9
R50
1K2
R51
1K8
C19
22μF
R16
39K
R17
39
R18
39
R19
39K
D3
BAX13
C11
68pF
R21
100
D4
BAX13
Q6
BC559C
Q7
BC559C
R15
120
R22
75
R20
120
C9
10μF
C10
10μF
R
75
S1
R1
2K2
C1
100K
R57
GREEN INPUT DIFFERENTIAL AMPLIFIER
Q1
BC559C
R7
39K
R8
39
R9
39
R10
39K
D1
BAX13
C8
68pF
R12
100
D2
BAX13
Q4
BC559C
Q5
BC559C
R6
120
R13
R11
120
C5
10μF
C7
10μF
G
S2
R2
2K2
C2
100K
R23
BLUE INPUT DIFFERENTIAL AMPLIFIER
Q3
BC559C
R25
39K
R26
39
R27
39
R28
39K
D5
BAX13
C14
68pF
R30
100
D6
BAX13
Q8
BC559C
Q9
BC559C
R24
120
R31
R29
120
C12
10μF
C13
10μF
B
S3
R3
2K2
C3
100K
INPUT CONNECTOR BOARD
R
G
B
26
8
26
9
26
R
28
8
28
9
28
G
30
8
30
9
30
B
32
⊥
VERTICAL SYNC INPUT DIFFERENTIAL AMPLIFIER
R41
100
Q11
BC559C
R43
39K
R44
150
R45
100
R46
39K
D9
BAX13
D10
BAX13
Q14
BC559C
Q15
BC559C
NEG.
POS.
R42
120
R48
75
R49
75
R47
120
C17
10μF
C18
10μF
on C715441
INPUT CONNECTOR BOARD
VS
75
S6
75
R4
2K2
C4
100K
external vertical sync
12
6
18
V.SYNC
EXTERNAL SYNC INPUT DIFFERENTIAL AMPLIFIER
R32
100
Q10
BC559C
R34
39K
R35
150
R36
150
R37
39K
D7
BAX13
D8
BAX13
Q12
BC559C
Q13
BC559C
NEG.
POS.
R33
120
R39
75
R40
75
R38
120
C15
10μF
C16
10μF
on C715441
INPUT CONNECTOR BOARD
S
S4
R5
2K2
C5
100K
+1
R53
68K
R55
150
C22
22μF
Q16
BC549C
R54
10K
R56
56
sync.
4
6
4
8
4
C.SYNC
S5
on C715411
G
X
sync on green/
external sync
INPUT CONNECTOR BOARD

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

RGB ANALOG BNC INPUT

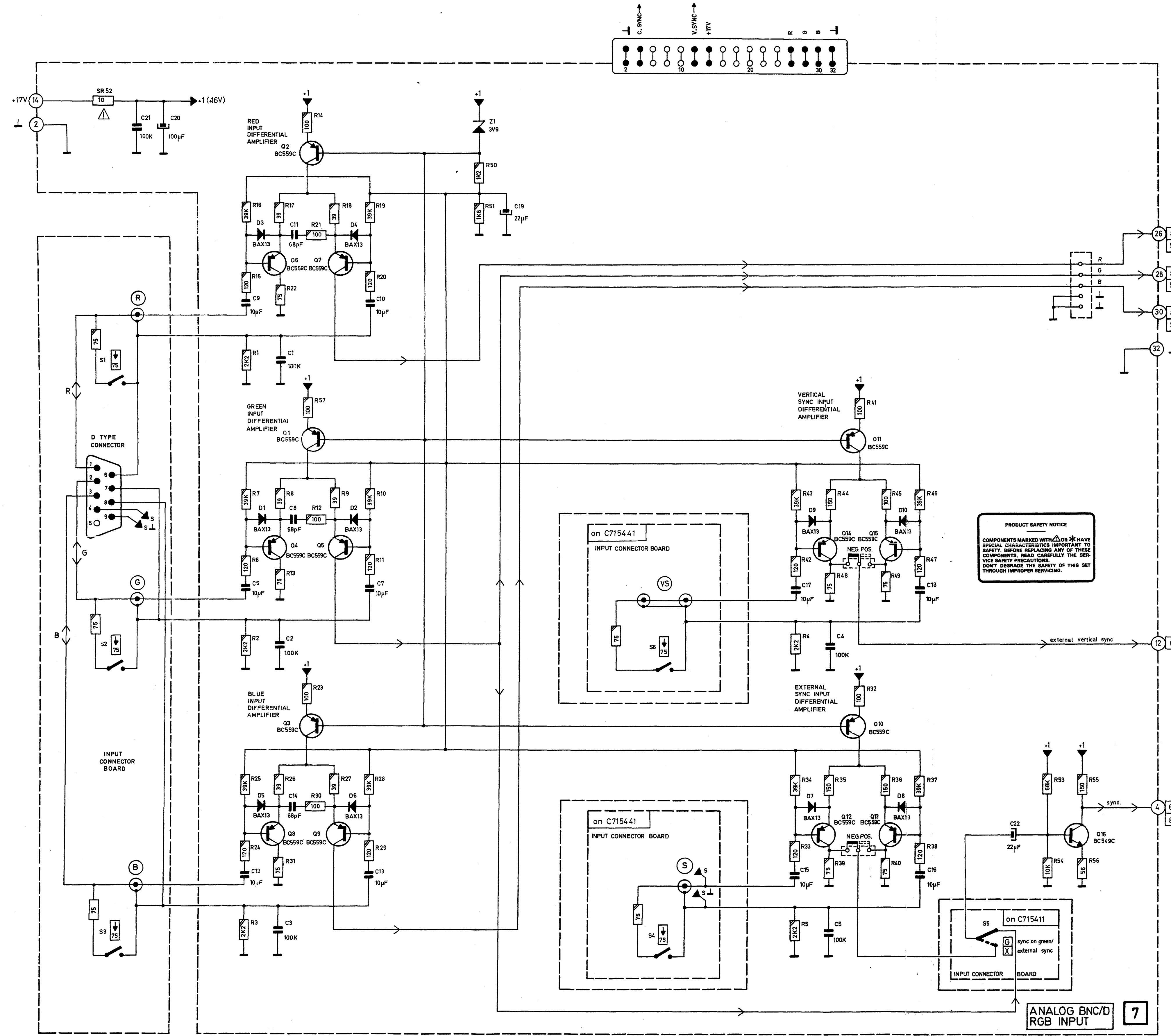
7

C660172/00 MODIFICATIONS RESERVED 100386

PARTS LIST OF UNIT $\boxed{7}$
RGB ANALOG BNC INPUT
Order number of a complete unit: C660172

Order number		Description	Item
V101119		RRCF 39E J 0.25	R17 ,R18 ,R26 ,R27 ,R8 ,R9
V101121		RRCF 56E J 0.25	R56
V1011231		RRCF 75E J 0.25	
V101124		RRCF 100E J 0.25	R12 ,R14 ,R21 ,R23 ,R30 ,R32 ,R41 R44 ,R45 ,R57
V101125		RRCF 120E J 0.25	R11 ,R15 ,R20 ,R24 ,R29 ,R33 ,R38 R42 ,R47 ,R6
V101126		RRCF 150E J 0.25	R35 ,R36 ,R55
C1011129	⚠	RRCFF 10E J 0.30	R52
V101137		RRCF 1K2 J 0.25	R50
V101158		RRCF 68K J 0.25	R53
V1012231		RRMF 75E J 0.50	R13 ,R22 ,R31 ,R39 ,R40 ,R48 ,R49
V101239		RRMF 1K8 J 0.50	R51
V101240		RRMF 2K2 J 0.50	R1 ,R2 ,R3 ,R4 ,R5
V101248		RRMF 10K J 0.50	R54
V101255		RRMF 39K J 0.50	R10 ,R16 ,R19 ,R25 ,R28 ,R34 ,R37 R43 ,R46 ,R7
V111157		CELAX 22M Z 25	C19 ,C22
C1114779		CELPR 100M M 25	C20
V111680		CELBI 10M VAC 40	C10 ,C12 ,C13 ,C15 ,C16 ,C17 ,C18 C6 ,C7 ,C9
V112240		CNPO MI 68P G5 63	C11 ,C14 ,C8
C112774		CCE MI100K S5 63	C1 ,C2 ,C21 ,C3 ,C4 ,C5
V131411		SMCTRA BC 549 C	Q16
V1314182		SMCTRA BC 559 C	Q1 ,Q10 ,Q11 ,Q12 ,Q13 ,Q14 ,Q15 Q2 ,Q3 ,Q4 ,Q5 ,Q6 ,Q7 ,Q8 Q9
V131621		SMCDIO BAX 13	D1 ,D10 ,D2 ,D3 ,D4 ,D5 ,D6 D7 ,D8 ,D9
V131757		SMCDIOZEN 0.5W C3.9	Z1
V313140		CON FOC UG-1094 /U	
C313286		CON MOB TE 2.54 P 3	
C3133921		CONF2.54 JUMPER SN	
C313590		CON MOB SE AU C P32	32 PINS CONNECTOR
C324127		SWITCH 4XA	
C600216		IPL RGBS INPUT CD351	DECORATIVE NAME PLATE
C605101		PC RGB INPUT CD351	PRINTED CIRCUIT BOARD
C714175		FIXPC VID.INPUT 02	METAL PC SUPPORT BRIDGE
C715441		PC C761002U	PRINTED CIRCUIT FOR INPUT CONN.
C721313U		INPUT PANEL	PLASTIC MOUNTING PLATE FOR INPUT CONNECTORS

R	52			16,15,1,7,6,2 ,25,24,3,17,22,8,13,26,31,14,57,23,21,12,30,18,9,27,19,20,10,11,28,29	50,51,			43.42.4.34,33,5,48,44,35,39,	41.32. 45.49.36.40.	46,47.38.37.			53,54	55.56
C		21	20	9.6.12 1,2, 3, 11,8,14. 10.7, 13.		19		17, 15 4,5		18,16		22		
MISC.	S1, S2.S3			D3,D1,D5,Q6,Q4,Q8,Q2,Q1,Q3,Q7,Q5,Q9.D4,D2,D6	Z1		S6, S4	D9,D7,Q14,Q12,	Q11.Q10. Q15.Q13.	D10.D8.	S5			Q16


C. SYNC
V.SYNC
+17V
R
G
B
2
10
20
30
32
+17V
14
2
SR52
10
C21
100K
C20
100µF
+1 (16V)
+1
R14
100
RED
INPUT
DIFFERENTIAL
AMPLIFIER
Q2
BC559C
Z1
3V9
R50
1K2
R51
1K8
C19
22µF
R16
39K
R17
39
R18
39
R19
39K
D3
BAX13
C11
68pF
R21
100
D4
BAX13
Q6
BC559C
Q7
BC559C
R15
120
R22
75
R20
120
C9
10µF
C10
10µF
R1
2K2
C1
100K
GREEN
INPUT
DIFFERENTIAL
AMPLIFIER
Q1
BC559C
R57
R7
R8
R9
R10
D1
C8
R12
D2
Q4
Q5
R6
R13
R11
C6
C7
R2
C2
BLUE
INPUT
DIFFERENTIAL
AMPLIFIER
Q3
BC559C
R23
R25
R26
R27
R28
D5
C14
R30
D6
Q8
Q9
R24
R31
R29
C12
C13
R3
C3
D TYPE
CONNECTOR
S1
S2
S3
75
INPUT
CONNECTOR
BOARD
VERTICAL
SYNC INPUT
DIFFERENTIAL
AMPLIFIER
Q11
BC559C
R41
R43
R44
R45
R46
D9
D10
Q14
Q15
BC559C
NEG. POS.
R42
R48
R49
R47
C17
C18
R4
C4
on C715441
INPUT CONNECTOR BOARD
VS
S6
external vertical sync
12
6
18
V.SYNC
EXTERNAL
SYNC INPUT
DIFFERENTIAL
AMPLIFIER
Q10
BC559C
R32
R34
R35
R36
R37
D7
D8
Q12
Q13
R33
R39
R40
R38
C15
C16
R5
C5
S
S4
C22
22µF
R53
68K
R54
10K
R55
150
R56
56
Q16
BC549C
sync.
4
6
8
C.SYNC
S5
on C715411
G
X
sync on green/
external sync
INPUT CONNECTOR BOARD
26
28
30
32

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

ANALOG BNC/D
RGB INPUT

7

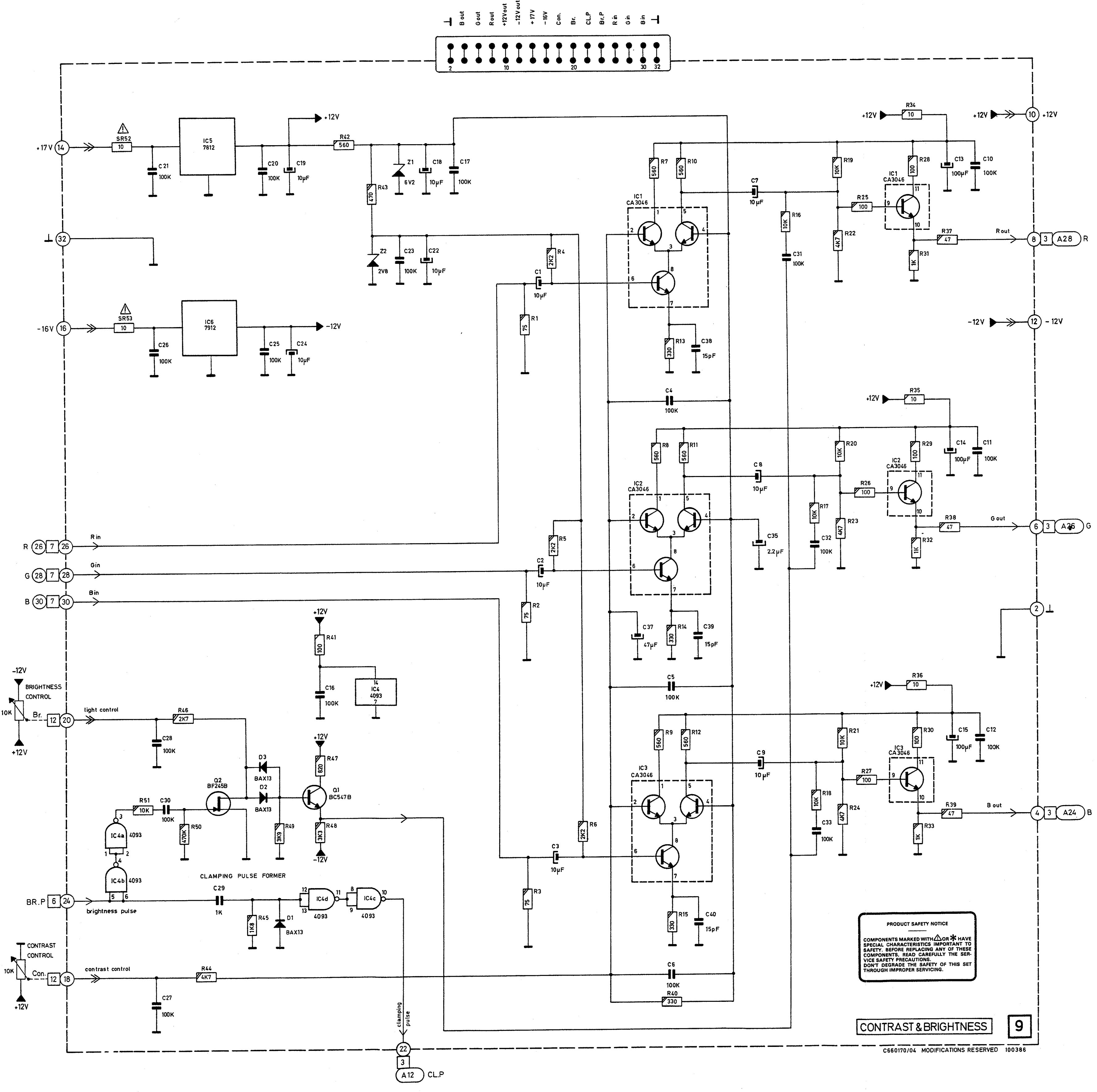
C6601722/00 MODIFICATIONS RESERVED 070286

PARTS LIST OF UNIT $\boxed{7}$
RGB ANALOG BNC/D INPUT

Order number of a complete unit: C6601722

Order number	Description	Item
V101119	RRCF 39E J 0.25	R17 ,R18 ,R26 ,R27 ,R8 ,R9
V101121	RRCF 56E J 0.25	R56
V1011231	RRCF 75E J 0.25	
V101124	RRCF 100E J 0.25	R12 ,R14 ,R21 ,R23 ,R30 ,R32 ,R41 R44 ,R45 ,R57
V101125	RRCF 120E J 0.25	R11 ,R15 ,R20 ,R24 ,R29 ,R33 ,R38 R42 ,R47 ,R6
V101126	RRCF 150E J 0.25	R35 ,R36 ,R55
C1011129 ⚠	RRCFF 10E J 0.30	R52
V101137	RRCF 1K2 J 0.25	R50
V101158	RRCF 68K J 0.25	R53
V1012231	RRMF 75E J 0.50	R13 ,R22 ,R31 ,R39 ,R40 ,R48 ,R49
V101239	RRMF 1K8 J 0.50	R51
V101240	RRMF 2K2 J 0.50	R1 ,R2 ,R3 ,R4 ,R5
V101248	RRMF 10K J 0.50	R54
V101255	RRMF 39K J 0.50	R10 ,R16 ,R19 ,R25 ,R28 ,R34 ,R37 R43 ,R46 ,R7
V111157	CELAX 22M Z 25	C19 ,C22
C1114779	CELPR 100M M 25	C20
V111680	CELBI 10M VAC 40	C10 ,C12 ,C13 ,C15 ,C16 ,C17 ,C18 C6 ,C7 ,C9
V112240	CNPO MI 68P G5 63	C11 ,C14 ,C8
C112774	CCE MI100K S5 63	C1 ,C2 ,C21 ,C3 ,C4 ,C5
V131411	SMCTRA BC 549 C	Q16
V1314182	SMCTRA BC 559 C	Q1 ,Q10 ,Q11 ,Q12 ,Q13 ,Q14 ,Q15 Q2 ,Q3 ,Q4 ,Q5 ,Q6 ,Q7 ,Q8 Q9
V131621	SMCDIO BAX 13	D1 ,D10 ,D2 ,D3 ,D4 ,D5 ,D6 D7 ,D8 ,D9
V131757	SMCDIOZEN 0.5W C3.9	Z1
V313140	CON FOC UG-1094 /U	
C313286	CON MOB TE 2.54 P 3	
C3133921	CONF2.54 JUMPER SN	
C313501	CON FO* TE DSUB P 9	CONNECTOR 9 PINS D-TYPE
C313590	CON MOB SE AU C P32	32 PINS CONNECTOR
C324127	SWITCH 4XA	
C600216	IPL RGBS INPUT CD351	DECORATIVE NAME PLATE
V600323	MOUNTING PANEL	
V600324	INPUT COVER D	
C605101	PC RGB INPUT CD351	PRINTED CIRCUIT BOARD
C714175	FIXPC VID.INPUT 02	METAL PC SUPPORT BRIDGE
V751241	PCB INPUT RGB D	PCB FOR INPUT PLUGS

R	52,53, 51	46,50	44			45		49	41,47,48	42	43				1,2,3	4,5	6		7,8,9,13,14,15,10,11,12, 40				16	17,18,	19,22,20,23,21,24,25,26,27,	34	28,31,35,29,32,36,30,33,	37,38,39	
C		28, 27, 30, 21, 26		29			20,25	19,24	16			23	18,22	17	1,2,3			37	4, 5, 6	38,39,40	7, 8, 9	35	31	32 33				13, 14,15	10,11,12
MISC.				IC5	IC6	Q2	D3 D2	D1	Q1		Z2 IC4	Z1							IC1, IC2, IC3										


⊥
B out
G out
R out
+12V out
−12V out
+17V
−16V
Con.
Br.
CL.P
Br.P
R in
G in
B in
⊥
2
10
20
30
32
+17V
14
SR52
10
C21
100K
IC5
7812
C20
100K
C19
10µF
+12V
R42
560
Z1
6V2
C18
10µF
C17
100K
R43
470
Z2
2V8
C23
100K
C22
10µF
32
⊥
−16V
16
SR53
10
C26
100K
IC6
7912
C25
100K
C24
10µF
−12V
R7
560
R10
560
IC1
CA3046
C7
10µF
R19
10K
R16
10K
R22
4K7
C31
100K
R25
100
R28
100
IC1
CA3046
C13
100µF
C10
100K
R34
10
+12V
10
+12V
R37
47
R31
1K
R out
8
3
A28
R
R4
2K2
C1
10µF
R1
75
R13
330
C38
15pF
−12V
12
−12V
C4
100K
R35
10
R8
560
R11
560
IC2
CA3046
C8
10µF
R20
10K
R17
10K
R23
4K7
C32
100K
R26
100
R29
100
C14
100µF
C11
100K
C35
2.2µF
R38
47
G out
6
3
A26
G
R32
1K
R5
2K2
C2
10µF
R2
75
C37
47µF
R14
330
C39
15pF
2
⊥
C5
100K
R36
10
R9
560
R12
560
IC3
CA3046
C9
10µF
R21
10K
R18
10K
R24
4K7
C33
100K
R27
100
R30
100
C15
100µF
C12
100K
R39
47
B out
4
3
A24
B
R33
1K
R6
2K2
C3
10µF
R3
75
R15
330
C40
15pF
C6
100K
R40
330
R
26
7
26
R in
G
28
7
28
G in
B
30
7
30
B in
+12V
R41
100
C16
100K
14
IC4
4093
7
−12V
BRIGHTNESS
CONTROL
10K
Br.
+12V
12
20
light control
R46
2K7
C28
100K
D3
BAX13
D2
BAX13
Q2
BF245B
R47
820
Q1
BC547B
R51
10K
C30
100K
R50
470K
R49
3K9
R48
3K3
−12V
IC4a
4093
IC4b
4093
CLAMPING PULSE FORMER
BR.P
6
24
brightness pulse
C29
1K
R45
1K8
D1
BAX13
IC4d
4093
IC4c
4093
CONTRAST
CONTROL
10K
Con.
+12V
12
18
contrast control
R44
4K7
C27
100K
clamping pulse
22
3
A12
CL.P

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

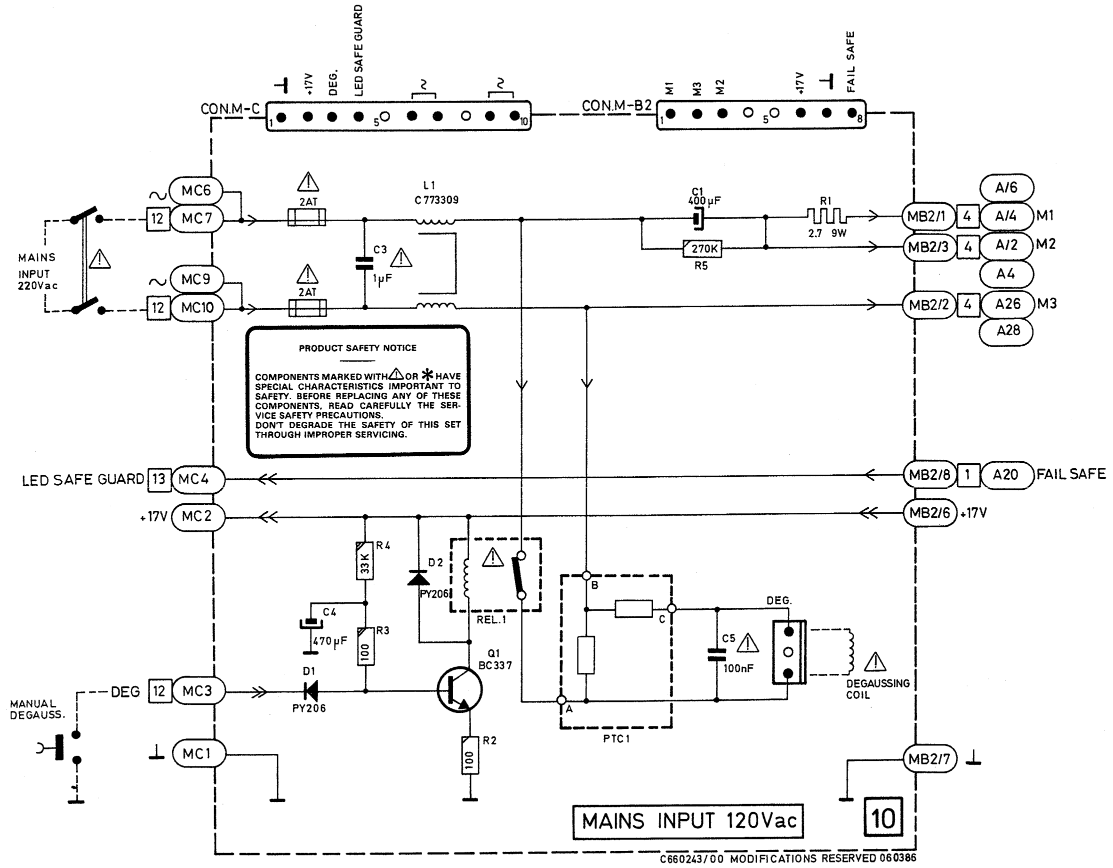
CONTRAST & BRIGHTNESS

9

PARTS LIST OF UNIT 9
CONTRAST & BRIGHTNESS
Order number of a complete unit: C660170

Order number	Description	Item
C1011129 ⚠	RRCFF 10E J 0.30	R52
C1011169 ⚠	RRCFF 22E J 0.30	R53
V101120	RRCF 47E J 0.25	R37 ,R38 ,R39
V101124	RRCF 100E J 0.25	R25 ,R26 ,R27 ,R28 ,R29 ,R30
V101130	RRCF 330E J 0.25	R13 ,R14 ,R15 ,R40
V101132	RRCF 470E J 0.25	R43
V101133	RRCF 560E J 0.25	R10 ,R11 ,R12 ,R7 ,R8 ,R9
V101168	RRCF 470K J 0.25	R50
C101212	RRCF 10E J 0.50	R34 ,R35 ,R36
V1012231	RRMF 75E J 0.50	R1 ,R2 ,R3
C101224	RRCF 100E J 0.50	R41
V101232	RRMF 470E J 0.50	R43
C101233	RRCF 560E J 0.50	R42
V101235	RRMF 820E J 0.50	R47
V101236	RRMF 1K J 0.50	R31 ,R32 ,R33
V101239	RRMF 1K8 J 0.50	R45
V101240	RRMF 2K2 J 0.50	R4 ,R5 ,R6
V101241	RRMF 2K7 J 0.50	R46
V111156	CELAX 10M Z 25	C22
C111161	CELAX 100M T 25	C13 ,C14 ,C15
V112232	CNPO MI 15P G5 63	C38 ,C39 ,C40
C112774	CCE MI100K S5 63	C10 ,C11 ,C12 ,C16 ,C17 ,C20 ,C21 C23 ,C25 ,C26 ,C27 ,C28 ,C30 ,C31 C32 ,C33 ,C4 ,C5 ,C6
C116311	CPP PR 1K H 160	C29
V1314071	SMCTRA BC 547 B	Q1
V1314651	SMCTRAFET BF 245 B	Q2
C131720	SMCDIOZEN 0.5W C6V2	Z1
C131770	SMCDIOZEN 0.4W C2V8	Z2
V132134	SMCICL CA 3046	IC1 ,IC2 ,IC3
C134002	SMCICLVOL LM 340T12	IC5
C134016	SMCICLVOL LM 320T12	IC6
V137394	SMCICD 4093 B	IC4
V313494	CON DIL RM 7.62 P14	
C313590	CON MOB SE AU C P32	32 PINS CONNECTOR
C605105	PC CONTRAST CD 351	PRINTED CIRCUIT BOARD
V7290351	PCB GRIP UNIVERSAL	

R	4,3 2 5 1
C	4 3 1, 5
MISC.	D1 D2 L1 Q1 REL1 PTC1


CON.M-C
+17V
DEG.
LED SAFE GUARD
CON.M-B2
M1
M3
M2
+17V
FAIL SAFE
MAINS
INPUT
220Vac
MC6
12
MC7
MC9
12
MC10
2AT
2AT
L1
C 773309
C3
1µF
C1
400µF
270K
R5
R1
2.7 9W
MB2/1
4
A/6
A/4
M1
MB2/3
4
A/2
M2
A4
MB2/2
4
A26
M3
A28
LED SAFE GUARD
13
MC4
MB2/8
1
A20
FAIL SAFE
+17V
MC2
MB2/6
+17V
R4
33K
D2
PY206
REL.1
C4
470µF
R3
100
B
C
DEG.
C5
100nF
DEGAUSSING
COIL
Q1
BC337
MANUAL
DEGAUSS.
DEG
12
MC3
D1
PY206
A
PTC1
MC1
R2
100
MB2/7
10

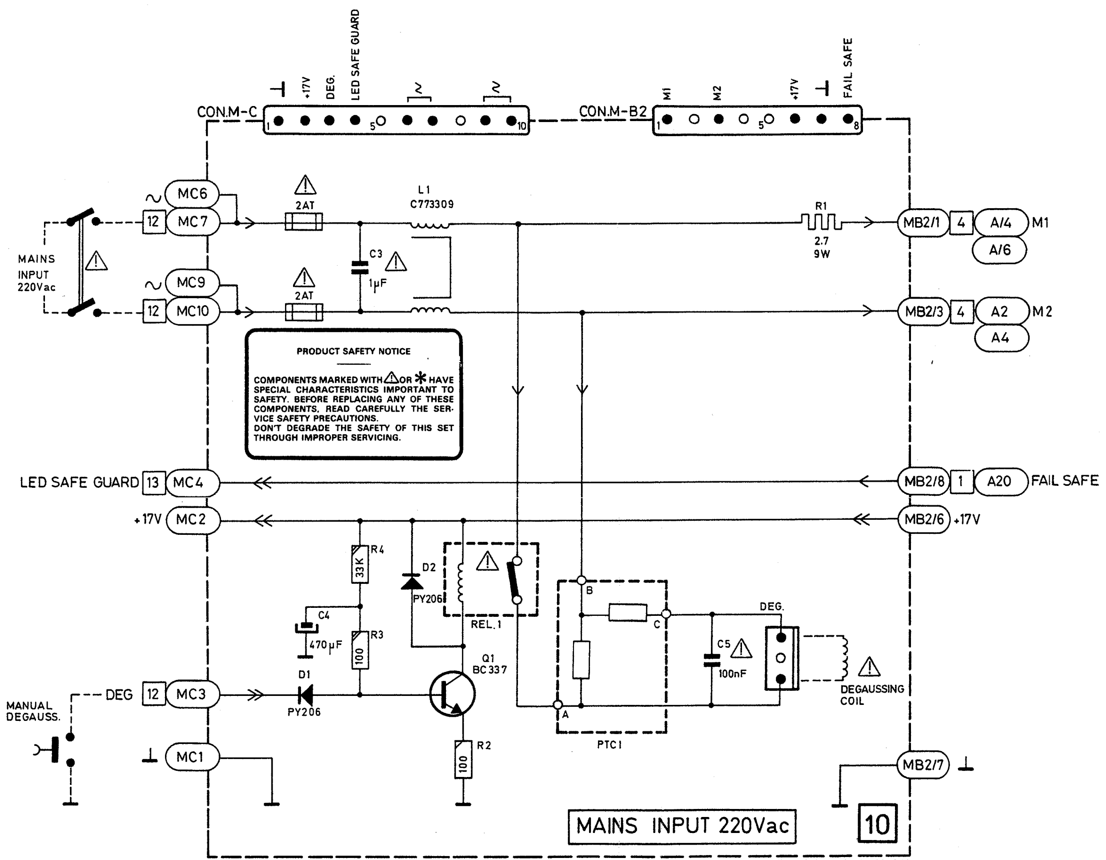
PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

MAINS INPUT 120Vac

C660243/00 MODIFICATIONS RESERVED 060386

R	4,3 2 1
C	4 3 5
MISC.	D1 D2 L1 Q1 REL1 PTC1


CON.M-C
+17V
DEG.
LED SAFE GUARD
CON.M-B2
M1
M2
+17V
FAIL SAFE
MAINS
INPUT
220Vac
MC6
12
MC7
MC9
12
MC10
2AT
2AT
L1
C773309
C3
1µF
R1
2.7
9W
MB2/1
4
A/4
M1
A/6
MB2/3
4
A2
M2
A4
LED SAFE GUARD
13
MC4
MB2/8
1
A20
FAIL SAFE
+17V
MC2
MB2/6
+17V
R4
33K
D2
PY206
REL.1
C4
470µF
R3
100
B
C
DEG.
C5
100nF
DEGAUSSING
COIL
Q1
BC337
MANUAL
DEGAUSS.
DEG
12
MC3
D1
PY206
A
PTC1
MC1
R2
100
MB2/7
10

PRODUCT SAFETY NOTICE

COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.

MAINS INPUT 220Vac

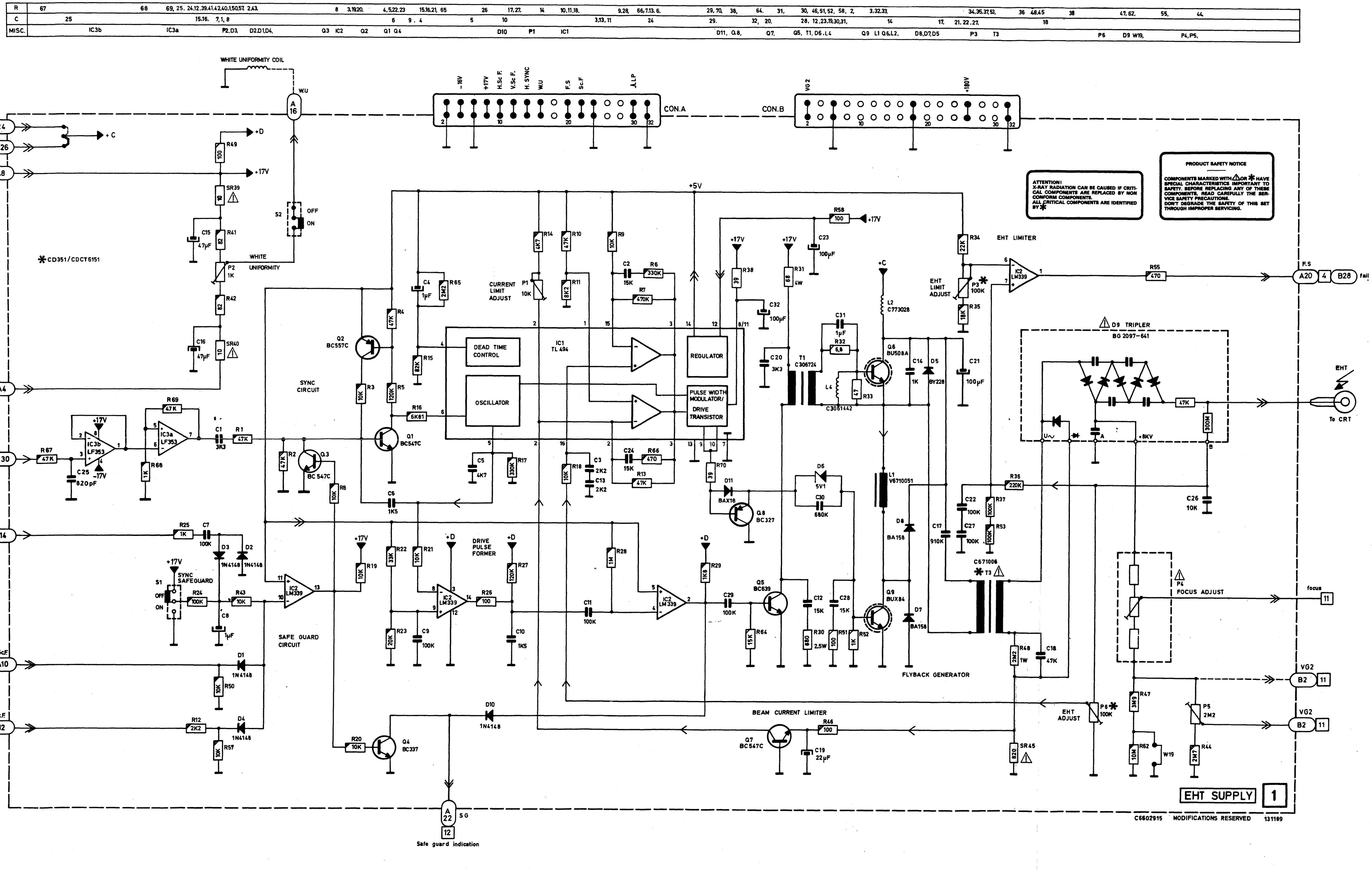
C6602431/00 MODIFICATIONS RESERVED 060386

PARTS LIST OF UNIT $\boxed{10}$
MAINS INPUT 120Vac
Order number of a complete unit: C660243

Order number	Description	Item
C101124	RRCF 100E J 0.25	R3
V101154	RRCF 33K J 0.25	R4
V101224	RRCF 100E J 0.50	R2
C101265	RRCF 270K J 0.50	R5
C104309	RRWW V 2E7 K 9.00	R1
C105210	RRPTC 120	PTC1
V1114799	CELPR 470M M 25	C4
C111655	CELRA 400M T 385	C1
C1147105	⚠ CPOSAPO100K MAC250	C5
C1147169	⚠ CPOSAPO 1M MAC250	C3
V131426	SMCTRA BC 337	Q1
C131911	SMCDIOREC PY 206	D1 ,D2
V306213	COIL 2X 15.0MH 2.0A	L1
C313220	RRWW V HOLDER H10	QTY:1
V313607	CON MOB TE .156 P 3	CON.DFG
C313660	CON MOB TE SV P 8	CON.M-B2
V313662	CON MOB TE SV P10	CON.M-C
C314132	FUSE HOLD PCB 6X32	QTY:4
C314138	⚠ FUSE 6X32 2.000A T	QTY:2
V324348	⚠ RELAY 285E 12V 2XU	REL1
V751194	MAINS INPUT	PRINTED CIRCUIT BOARD

PARTS LIST OF UNIT $\boxed{10}$
MAINS INPUT 220Vac
Order number of a complete unit: C6602431

Order number	Description	Item
C101124	RRCF 100E J 0.25	R3
V101154	RRCF 33K J 0.25	R4
V101224	RRCF 100E J 0.50	R2
C104309	RRWW V 2E7 K 9.00	R1
C105209	RRPTC 220	PTC1
V1114799	CELPR 470M M 25	C4
C1147105	⚠ CPOSAPO100K MAC250	C5
C1147169	⚠ CPOSAPO 1M MAC250	C3
V131426	SMCTRA BC 337	Q1
C131911	SMCDIOREC PY 206	D1 ,D2
V306213	COIL MAINS 2A-DK61	L1
C313220	RRWW V HOLDER H10	QTY:1
V313607	CON MOB TE .156 P 3	CON.DFG
C313660	CON MOB TE SV P 8	CON.M-B2
V313662	CON MOB TE SV P10	CON.M-C
C314116	⚠ FUSE 5X20 2.000A S	QTY:2
V314501	FUSE HOLD PCB 5X20	QTY:2
V324348	⚠ RELAY 285E 12V 2XU	REL1
V751194	MAINS INPUT	PRINTED CIRCUIT BOARD



R 67 68 69, 25. 24.12.39.41.42.40.1.50.57. 2.43. 8 3.19.20. 4.5.22.23 15.16.21, 65 26 17.27. 14 10.11.18. 9.28. 66.7.13. 6. 29, 70, 38, 64. 31. 30, 46, 51, 52, 58, 2, 3.32.33. 34.35.37.53. 36 48.45 38 47, 62, 55, 44.
C 25 15.16. 7, 1, 8 6 9 . 4 5 10 3.13, 11 24 29. 32, 20. 28, 12.23.19.30.31, 14 17. 21. 22. 27. 18
MISC. IC3b IC3a P2.D3. D2.D1.D4. Q3 IC2 Q2 Q1 Q4 D10 P1 IC1 D11, Q8, Q7. Q5, T1, D6 .L4 Q9 L1 Q6.L2. D8.D7.D5 P3 T3 P6 D9 W19, P4,P5.
WHITE UNIFORMITY COIL
W.U
A 16
-16V
+17V
H.Sc F.
V.Sc F.
H. SYNC
W.U
F.S
Sc.F
⎍LP
CON.A
CON.B
VG 2
+180V
+140V B24
+180V B26
+17V A8
+C
+D
+17V
R49 100
SR39 10
C15 47µF
R41 82
P2 1K
R42 82
C16 47µF
SR40 10
S2 OFF ON
WHITE UNIFORMITY
✱CD351/CDCT6151
-16V A4
+5V
C4 1µF
R65 2M2
R4 47K
Q2 BC557C
R15 82K
R3 10K
R5 120K
SYNC CIRCUIT
R16 6K81
Q1 BC547C
R69 47K
IC3b LF353
IC3a LF353
C1 3K3
R1 47K
R67 47K
C25 820pF
R66 1K
⎍LP B4 2 A30
Horizontal flyback pulse
R2 47K
Q3 BC 547C
R8 10K
C6 1K5
R14 4K7
P1 10K
CURRENT LIMIT ADJUST
R10 47K
R11 8K2
R9 10K
C2 15K
R6 330K
R7 470K
IC1 TL 494
DEAD TIME CONTROL
OSCILLATOR
REGULATOR
PULSE WIDTH MODULATOR/ DRIVE TRANSISTOR
C5 4K7
R17 330K
R18 10K
C3 2K2
C13 2K2
C24 15K
R66 470
R13 47K
R70 39
D11 BAX18
Q8 BC327
R58 100
C23 100µF
R38 39
R31 68 4W
C32 100µF
C20 3K3
T1 C306724
C31 1µF
R32 6,8
L4
R33 47
C3061442
Q6 BU508A
L2 C773028
C14 1K
D5 BY228
C21 100µF
D6 5V1
C30 680K
L1 V6710051
D8 BA158
C17 910K
30 6 A14
H. Sync.
R25 1K
C7 100K
D3 1N4148
D2 1N4148
S1 SYNC SAFEGUARD OFF ON
R24 100K
R43 10K
C8 1µF
IC2 LM339
SAFE GUARD CIRCUIT
R19 10K
R22 33K
R21 10K
R23 20K
C9 100K
DRIVE PULSE FORMER
R26 100
R27 120K
C10 1K5
C11 100K
R28 1M
R29 1K8
C29 100K
R64 15K
Q5 BC639
C12 15K
R30 680 2,5W
C28 15K
R51 100
R52 1K
Q9 BUX84
D7 BA158
FLYBACK GENERATOR
B26 2 A10 H.Sc.F.
horizontal scan failure
D1 1N4148
R50 10K
30 5 A12 V.Sc.F.
vertical scan failure
R12 2K2
D4 1N4148
R57 10K
D10 1N4148
R20 10K
Q4 BC337
A 22 SG
12
Safe guard indication
BEAM CURRENT LIMITER
Q7 BC547C
R46 100
C19 22µF
R34 22K
EHT LIMITER
EHT LIMIT ADJUST
P3 ✱ 100K
R35 18K
IC2 LM339
R55 470
F.S A20 4 B28 fail safe
D9 TRIPLER BG 2097-641
47K
300M
EHT
To CRT
+8KV
R36 220K
C22 100K
R37 100K
C27 100K
R53 100K
C26 10K
C671006 ✱ T3
P4 FOCUS ADJUST
focus 11
R48 2M2 1W
C18 47K
SR45 820
EHT ADJUST
P6 ✱ 100K
R47 3M9
R62 10M
W19
P5 2M2
R44 2M7
VG2 B2 11
VG2 B2 11
EHT SUPPLY 1
C6802915
MODIFICATIONS RESERVED
131189

ATTENTION!
X-RAY RADIATION CAN BE CAUSED IF CRITICAL COMPONENTS ARE REPLACED BY NON CONFORM COMPONENTS.
ALL CRITICAL COMPONENTS ARE IDENTIFIED BY ✱

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COMPONENTS MARKED WITH ⚠ OR ✱ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS, READ CAREFULLY THE SERVICE SAFETY PRECAUTIONS.
DON'T DEGRADE THE SAFETY OF THIS SET THROUGH IMPROPER SERVICING.